Appendices for the Navajo Nation Lake Fish and Water Quality Investigation

Appendix A. Common and Scientific Names of Fish That May Occur on the Navajo Nation.

Common Name	**Scientific Name**
White sucker	*Catostomus commersoni*
Bluehead sucker	*Catostomus discobolus discobolus*
Zuni bluehead sucker	*Catostomus discobolus yarrowi*
Flannelmouth sucker	*Catostomus latipinnis*
Mottled sculpin	*Cottus bairdi*
Red shiner	*Cyprinella lutrensis*
Common carp	*Cyprinus carpio*
Threadfin shad	*Dorosoma petenense*
Plains killifish	*Fundulus zebrinus*
Western mosquitofish	*Gambusia affinis*
Bonytail chub	*Gila elegans*
Roundtail chub	*Gila robusta robusta*
Black bullhead	*Ictalurus melas*
Channel catfish	*Ictalurus punctatus*
Green sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear sunfish	*Lepomis megalotis*
Largemouth bass	*Micropterus salmoides*
Striped bass	*Morone saxatilis*
Rainbow trout	*Oncorhynchus gairdneri*
Yellow perch	*Perca flavescens*
Fathead minnow	*Pimephales promelas*
White crappie	*Pomoxis annularis*
Colorado pikeminnow	*Ptychocheilus lucius*
Speckled dace	*Rhinichthys osculus*
Brown trout	*Salmo trutta*
Walleye	*Stizostedion vitreum*
Razorback sucker	*Xyrauchen texanus*

Appendix B. Common and Scientific Names of Plants That May Occur on the Navajo Nation.

Common Name	**Scientific Name**
Box elder	*Acer interius*
Streambank wheatgrass	*Agropyron riparium*
Western wheatgrass	*Agropyron smithii*
Wheatgrass	*Agropyron sp.*
Slender wheat grass	*Agropyron trachycaulum*
Redtop	*Agrostis alba*
Creeping bentgrass	*Agrostis palustris*
Water foxtail	*Alopecurus aegaulilis sobol*
Tumbleweed	*Amaranthus graecizans*
Flatspine burr ragweed	*Ambrosia acanthicarpa*
Serviceberry	*Amelanchier alnifolia*
Western service berry	*Amelanchier utahensis*
Rockcress	*Arabis perennans*
Three-awns	*Aristida sp.*
Indian root	*Aristolochia watsoni*
Tarragon	*Artemisia dracunculoides*
Fringed sage	*Artemisia frigida*
White sagebrush	*Artemisia ludoviciana*
Black sagebrush	*Artemisia nova*
Basin big sagebrush	*Artemisia tridentata*
Milkweed	*Asclepias fascicularis*
Four-wing saltbush	*Atriplex canescens*
Shadescale	*Atriplex confertifolia*
Annual atriplex	*Atriplex hastate*
Redscale	*Atriplex rosea*
Wild oat	*Avena fatua*
American slough grass	*Beckmannia syzigachne*
Water birch	*Betula occidentalis*
Blue gramma	*Bouteloua gracilis*
Meadow brome	*Bromus commutatus*
Cheatgrass	*Bromus tectorum*
Emory's Sedge	*Carex emoryi*
Stalkgrain sedge	*Carex stipata*
Fox sedge	*Carex vulpinoidea*
Indian paintbrush	*Castilleja linariaefolia*
Netleaf hackberry	*Celtis reticulata*
Mountain-mahogany	*Cercocarpus montanus*
Lambsquarters	*Chenopodium album*
Rubber rabbitbrush	*Chrysothamnus nauseosus*
Chicory	*Cichorium intybus*
Water hemlock	*Cicuta douglasii*
Parry's thistle	*Circium parryi*

Appendix B continued. Common and Scientific Names of Plants That May Occur on the Navajo Nation.

Common Name	Scientific Name
Virgin's bower	*Clematis lingustifolia*
Rocky mountain beeplant	*Cleome serrulata*
Field bindweed	*Convolvulus arvensis*
Redosier dogwood	*Cornus stolonifera*
Cliffrose	*Cowania mexicana*
River hawthorn	*Crataegus rivularis*
Missoure gourd	*Cucurbita foetidissima*
Cymopterus	*Cymopterus newberryi*
Cymopterus	*Cympoterus fendleri*
Orchard grass	*Dactylis glomerata*
Western tansymustard	*Descurainia pinnata*
Hairy crabgrass	*Digitaria sanguinalis*
Salt grass	*Distichlis stricta*
Barnyard grass	*Echinochloa crusgalli*
Russian olive	*Elaeagnus angustifolia*
Spike rush	*Eleocharis macrostachya*
Creeping spike rush	*Eleocharis palustris*
Canada wildrye	*Elymus canadensis*
Mormon tea	*Ephedra torreyana*
Green joint-fir	*Ephedra viridis*
American willowherb	*Epilobium adenocaulon*
Common horsetail	*Equisetum arvense*
Dwarf horsetail	*Equisetum kansanum*
Smooth scouring rush	*Equisetum laevigatum*
Green rabbitbrush	*Ericameria viscidiflora*
Bisti fleabane	*Erigeron bistiensis*
Canadian fleabane	*Erigeron canadensis*
Buckwheat	*Eriogonum sp.*
Red-stemmed filaree	*Erodium cicutarium*
Blister cress	*Erysium rapandum*
Ridgeseed spurge	*Euphorbia glyptosperma*
Thyme leaved spurge	*Euphorbia serpyllifolia*
Barrel cactus	*Ferocactus wislizenii*
Meadow fescue	*Festuca elatior*
New Mexico olive	*Forestiera neomexicana*
Reed manna grass	*Glyceria grandis*
American licorice	*Glycyrrhiza lepidota*
Spiny hopsage	*Grayia spinosa*
Broom snakeweed	*Gutierrezia sarothrae*
Common sunflower	*Helianthus annuus*
Golden aster	*Heterotheca villosa*

Appendix B continued. Common and Scientific Names of Plants That May Occur on the Navajo Nation.

Common Name	Scientific Name
Galleta	*Hilaria jamesii*
Foxtail barley	*Hordeum jubatum caespitosum*
Wall barley	*Hordeum murinum*
Cultivated barley	*Hordeum vulgare*
Wiregrass	*Juncus balticus*
Torrey's rush	*Juncus torreyi*
Juniper	*Juniperus sp.*
Mexican-fireweed	*Kochia scoparia*
Little leaf ratany	*Krameria sp.*
Blue lettuce	*Lactuca pulchella*
Aspen pea	*Lathyrus laetivirens*
Hoary cress	*Lepidium drapa*
Desert pepperweed	*Lepidium fremonti*i
Clasping pepperweed	*Lepidium perfoliatum*
Blue flax	*Linum lewisi*i
Spurred lupine	*Lupinus laxiflorus*
Small lupine	*Lupinus pusillus*
Pale wolfberry	*Lycium pallidum*
Nees	*Machaeranthera tanacetifolia*
Cheeseweed mallow	*Malva parviflora*
Horehound	*Marrubium vulgare*
Black medick	*Medicago lupulina*
Alfalfa	*Medicago sativa*
White sweetclover	*Melilotus albus*
Yellow sweetclover	*Melilotus officinalis*
Mint	*Mentha penardi*
Adonis blazingstar	*Mentzelia multiflora*
Common monkeyflower	*Mimulus guttatus*
Colorado four-o'clock	*Mirabilis multiflora*
Pony beebalm	*Monarda pectinata*
Scratchgrass	*Muhlenbergia asperifolia*
Sandhill muhly	*Muhlenbergia pungens*
Muhly	*Muhlenbergia torreyi*
European watercress	*Nasturtium Officinale*
Evening primrose	*Oenothera marginata*
Cholla	*Opuntia sp.*
Pricklybear cactus	*Opuntia sp.*
Indian ricegrass	*Oryzopsis hymenoides*
Witchgrass	*Panicum capillare*
Virginia creeper	*Parthenocissus inserta*
Timothy	*Phleum pratense*

Appendix B continued. Common and Scientific Names of Plants That May Occur on the Navajo Nation.

Common Name	Scientific Name
Common reed	*Phragmites communis*
Pinyon pine	*Pinus edulis*
Narrowleaf plantain	*Plantago lanceolata*
Common plantain	*Plantago major*
Kentucky bluegrass	*Poa pratensis*
Knotgrass	*Polygonum aviculare*
Annual rabbitsfoot grass	*Polypogon monospeliensis*
Narrow-leaf cottonwood	*Populus angustifolia*
Rio Grande cottonwood	*Populus wislizenii*
Little hogweed	*Portulaca oleracea*
Silverweed	*Potentilla anserina*
Alkali grass	*Puccinellia pauciflora*
Antelope bitterbrush	*Purshia tridentata*
Oak	*Quercus sp.*
Alkali buttercup	*Ranunculus cymbalaria*
Poison ivy	*Rhus radicans*
Squawbush	*Rhus trilobata*
Wax currant	*Ribes cereum*
Watercress	*Rorippa nasturtium-aquaticum*
Spreading yellowcress	*Rorippa sinuata*
Wildrose	*Rosa fendleri*
Cutleaf coneflower	*Rudbeckia laciniata*
Curly dock	*Rumex crispus*
Peach-leaf willow	*Salix amygdaloides*
Coyote willow	*Salix exigua*
Pacific willow	*Salix lasiandra*
Russian thistle	*Salsola kali tenuifolia*
Greasewood	*Sarcobatus vermiculatus*
Hardstem bulrush	*Scirpus acutus*
Olney bulrush	*Scirpus americanus*
Cloaked bulrush	*Scirpus pallidus*
Bulrush	*Scirpus paludosus*
Giant bulrush	*Scirpus validus*
Brack’s fishhook cactus	*Sclerocactus cloveriae var. brackii*
Mesa Verde cactus	*Sclerocactus mesae-verdae*
Skullcap	*Scutellaria galericulata*
Rye	*Secale cereale*
Senecio	*Senecio cymbalarioides*
Threadleaf groundsel	*Senecio longilobus*
Green foxtail	*Setaria viridis*
Tumbling mustard	*Sisymbrium altissimum*

Appendix B continued. Common and Scientific Names of Plants That May Occur on the Navajo Nation.

Common Name	Scientific Name
Bottlebrush squirreltail	*Sitanion hystrix*
False soloman's seal	*Smilacina stellata*
Cutleaf nightshade	*Solanum triflorum*
Goldenrod	*Solidago sparsiflora*
Emory's globe mallow	*Sphaeralcea emoryi*
Globemallow	*Sphaeralcea sp.*
Alkaki sacaton	*Sporobolus airoides*
Spike dropseed	*Sporobolus contractus*
Sand dropseed	*Sporobolus cryptandrus*
Salt cedar	*Tamarix chinensis*
Common dandelion	*Taraxacum officinale*
Mountain meadow rue	*Thalictrum fendleri*
Puncturevine	*Tribulus terrestris*
Rancheria clover	*Trifolium albopurpureum*
White clover	*Trifolium repens*
Wheat	*Triticum aestivum*
Common cattail	*Typha latifolia*
Brewer nettle	*Urtica breweri*
Common mullein	*Verbascum thapsus*
Golden crownbeard	*Verbesina encelioides*
Water speedwell	*Veronica anagallis-aquatica*
Rough cockleburr	*Xanthium strumarium*
Yucca	*Yucca sp.*
Cultivated corn	*Zea maes*

Appendix C. Common and Scientific Names of Birds That May Occur on the Navajo Nation.

Common Name	**Scientific Name**
Cooper's hawk	*Accipiter cooperii*
Sharp-shinned hawk	*Accipiter striatus*
Northern goshawk	*Accipter gentilis*
Spotted sandpiper	*Actitis macularia*
Western grebe	*Aechmorphorus occidentalis*
Northern sah-whet owl	*Aeogolius acadicus*
White-throated swift	*Aeronautes saxatalis*
Red-winged blackbird	*Agelaius phoeniceus*
Cassin's sparrow	*Aimophila cassinii*
Wood duck	*Aix sponsa*
Chukar	*Alectoris chukar*
Baird's sparrow	*Ammodramus bairdii*
Sage sparrow	*Amphispiza belli*
Black-throated sparrow	*Amphispiza bilineata*
Northern pintail	*Anas acuta*
American wigeon	*Anas americana*
Northern shoveler	*Anas clypeata*
Green-winged teal	*Anas crecca*
Cinnamon teal	*Anas cyanoptera*
Blue-winged teal	*Anas discors*
Mallard	*Anas platyrhynchos*
Gadwall	*Anas strepera*
White-fronted goose	*Anser albifrons*
Water pipit	*Anthus rebescens*
Western scrub jay	*Aphelocoma californica*
Golden eagle	*Aquila chrysaetos*
Black-chinned hummingbird	*Archilochus alexandri*
Great egret	*Ardea alba*
Great blue heron	*Ardea herodias*
Short-eared owl	*Asio flammeus*
Long-eared owl	*Asio otus*
Lesser scaup	*Aythya affinis*
Redhead	*Aythya americana*
Ring-necked duck	*Aythya collaris*
Canvasback	*Aythya valisineria*
Upland plover	*Bartramia longicauda*
Upland sandpiper	*Bartramia longicauda*
Cedar waxwing	*Bombycilla cedrorum*
Bohemian waxwing	*Bombycilla garrulus*
American bittern	*Botarus lentiginosus*
Canada goose	*Branta canadensis*
Great-horned owl	*Bubo virginiansus*

Appendix C continued. Common and Scientific Names of Birds That May Occur on the Navajo Nation.

Common Name	Scientific Name
Bufflehead	*Bucephala albeola*
Common goldeneye	*Bucephala clangula*
Barrow's goldeneye	*Bucephala islandica*
Red-tailed hawk	*Buteo jamaicensis*
Rough-legged hawk	*Buteo lagopus*
Ferruginous hawk	*Buteo regalis*
Swainson's hawk	*Buteo swainsoni*
Green heron	*Butorides virescens*
Lark bunting	*Calamospiza melanocorys*
Sanderling	*Calidris alba*
Baird's sandpiper	*Calidris bairdii*
Western sandpiper	*Calidris mauri*
Pectoral sandpiper	*Calidris melanotos*
Least sandpiper	*Calidris minutilla*
Gambel's quail	*Callipepla gambelii*
Scaled quail	*Callipepla squamata*
Lawrence's goldfinch	*Carduelis lawrencei*
Pine siskin	*Carduelis pinus*
Lesser goldfinch	*Carduelis psaltria*
American goldfinch	*Carduelis tristis*
Cassin's finch	*Carpodacus cassinii*
House finch	*Carpodacus mexicanus*
Turkey vulture	*Cathartes aura*
Hermit thrush	*Catharus guttatus*
Swainson's thrush	*Catharus ustulatus*
Canon wren	*Catherpes mexicanus*
Willet	*Catoptrophorus semipalmatus*
Greater Sage grouse	*Centrocercus urophasianus*
Brown creeper	*Certhia americana*
Belted kingfisher	*Ceryle alcyon*
Snowy plover	*Charadrius alexandrinus*
Mountain plover	*Charadrius montanus*
Semi-palmated plover	*Charadrius semipalmatus*
Killdeer	*Charadrius vociferus*
Snow goose	*Chen caerulescens*
Black tern	*Chlidonias niger*
Lark sparrow	*Chondestes grammacus*
Common nighthawk	*Chordeiles minor*
American Dipper	*Cinclus mexicanus*
Norther harrier hawk	*Circus cyaneus*
Evening grosbeak	*Coccothraustes vespertinus*

Appendix C continued. Common and Scientific Names of Birds That May Occur on the Navajo Nation.

Common Name	Scientific Name
Yellow-billed cuckoo	*Coccyzus americanus*
Northern flicker	*Colaptes auratus*
Band-tailed pigeon	*Columba fasciata*
Rock dove	*Columba livia*
Inca dove	*Columbina inca*
Olive-sided flycatcher	*Contopus cooperi*
Greater pewee	*Contopus pertinax*
Western wood-pewee	*Contopus sordidulus*
American crow	*Corvus brachyrhynchos*
Common raven	*Corvus corax*
Blue jay	*Cyanocitta crystata*
Steller's jay	*Cyanocitta stelleri*
Black swift	*Cypseloides niger*
Blue grouse	*Dendragapus obscurus*
Black-throated blue warbler	*Dendroica caerulescens*
Yellow-rumped warbler	*Dendroica coronata*
Grace's warbler	*Dendroica graciae*
Black-throated gray warbler	*Dendroica nigrescens*
Hermit warbler	*Dendroica occidentalis*
Palm warbler	*Dendroica palmarum*
Yellow warbler	*Dendroica petechia*
Townsend's warbler	*Dendroica townsendi*
Black-throated green warbler	*Dendroica virens*
Gray catbird	*Dumetella carolinensis*
Snowy egret	*Egretta thula*
White pelican	*Elecanus erythorhynchos*
Western flycatcher	*Empidonax difficilis*
Hammond's flycatcher	*Empidonax hammondii*
Dusky flycatcher	*Empidonax oberholseri*
Southwestern willow flycatcher	*Empidonax traillii extimus*
Gray flycatcher	*Empidonax wrightii*
Horned lark	*Eremophila alpestris*
Brewer's blackbird	*Euphagus cyanocephalus*
Merlin	*Falco columbarius*
Prairie falcon	*Falco mexicanus*
American peregrine falcon	*Falco peregrinus anatum*
Arctic peregrine falcon	*Falco peregrinus tundrius*
American kestrel	*Falco sparverius*
American coot	*Fulica americana*
Common snipe	*Gallinago gallinago*
Common gallinule	*Gallinula chloropus*

Appendix C continued. Common and Scientific Names of Birds That May Occur on the Navajo Nation.

Common Name	Scientific Name
Greater roadrunner	*Geococcyx californianus*
Common yellowthroat	*Geothlypis trichas*
Pygmy owl	*Glaucidium californicum*
Blue grosbeak	*Guiraca caerulea*
Piñon jay	*Gymnorhinus cyanocephalus*
Bald eagle	*Haliaeetus leucocephalus*
Black-necked stilt	*Himantopus mexicanus*
Barn swallow	*Hirundo rustica*
Yellow-brested chat	*Icteria virens*
Northern oriole	*Icterus galbula*
Scott's oriole	*Icterus parisorum*
Mississippi kite	*Ictinia mississippiensis*
Least bittern	*Ixobrychus exilis*
Gray-headed junco	*Junco caniceps*
Dark-eyed junco	*Junco hyemalis*
Northern shrike	*Lanius exubitor*
Loggerhead shrike	*Lanius ludovicianus*
Herring gull	*Larus argentatus*
Laughing gull	*Larus atricilla*
California gull	*Larus californicus*
Ring-billed gull	*Larus delawarensis*
Bonaparte's gull	*Larus philidelphia*
Franklin's gull	*Larus pipixcan*
Black rosy finch	*Leucosticte atrata*
Brown-capped rosy finch	*Leucosticte australis*
Gray-crowned rosy finch	*Leucosticte tephrocotis*
Long-billed dowithcher	*Limnodromus scolopaceus*
Marbled godwit	*Limosa fedoa*
Hooded merganser	*Lophodytes cucullatus*
Red crossbill	*Loxia curvirostra*
Red-headed woodpecker	*Melanerpes erythrocephalus*
Acorn woodpecker	*Melanerpes formicivorus*
Lewis woodpecker	*Melanerpes lewis*
Surf scoter	*Melanitta perspicillata*
Turkey	*Meleagris gallopavo*
Lincoln's sparrow	*Melospiza lincolnii*
Song sparrow	*Melospiza melodia*
Common merganser	*Mergus merganser*
Red-breasted merganser	*Mergus serrator*
Northern mockingbird	*Mimus polyglottos*
Black and white warbler	*Mniotilta varia*

Appendix C continued. Common and Scientific Names of Birds That May Occur on the Navajo Nation.

Common Name	Scientific Name
Brown-headed cowbird	*Molothrus ater*
Townsend's solitaire	*Myadestes townsendi*
Ash-throated flycatcher	*Myiarchus cinerascens*
Clark's nutcracker	*Nucifraga columbiana*
Long-billed curlew	*Numenius americanus*
Black-crowned night heron	*Nycticorax nycticorax*
Whistling swan	*Olor columbianus*
MacGillivray's warbler	*Oporornsis tolmiei*
Sage thrasher	*Oreoscoptes montanus*
Screech owl	*Otus asio*
Flammulated owl	*Otus flammeolus*
Ruddy duck	*Oxyura jamaicensis*
Osprey	*Pandoin haliaetus*
Plain titmouse	*Parus inornatus*
House sparrow	*Passer domesticus*
Savannah sparrow	*Passerculus sandwichensis*
Fox sparrow	*Passerella iliaca*
Lazuli bunting	*Passerina amoena*
Indigo bunting	*Passerina cyanea*
Brown pelican	*Pelecanus occidentalis*
Gray jay	*Perisoreus canadensis*
Double-crested cormorant	*Phalacrocorax auritus*
Common poorwill	*Phalaenoptilus nuttallii*
Red-necked phalarope	*Phalaropus lobatus*
Wilson's phalarope	*Phalaropus tricolor*
Ring-necked pheasant	*Phasianus colchicus*
Rose-breasted grosbeak	*Pheuticus ludovicianus*
Black-headed grosbeak	*Pheuticus melanocephalus*
Black-billed magpie	*Pica hudsonia*
Downy woodpecker	*Picoides pubescens*
Northern three-toed woodpecker	*Picoides tridactylus*
Hairy woodpecker	*Picoides villosus*
Green-tailed towhee	*Pipilo chlorurus*
Rufous-sided towhee	*Pipilo erythrophthalmus*
Brown towhee	*Pipilo fuscus*
Hepatic tanager	*Piranga flava*
Western tanager	*Piranga ludoviciana*
Scarlet tanager	*Piranga olivacea*
White-faced ibis	*Plegadis chihi*
Black-bellied plover	*Pluvialis squatarola*
Horned grebe	*Podiceps auritus*

Appendix C continued. Common and Scientific Names of Birds That May Occur on the Navajo Nation.

Common Name	Scientific Name
Eared grebe	*Podiceps nigricollis*
Pied-billed grebe	*Podilymbus podiceps*
Black-capped chickadee	*Poecile atricapilla*
Mountain chickadee	*Poecile gambeli*
Blue-gray gnatcatcher	*Polioptila caerulea*
Vesper sparrow	*Pooecetes gramineus*
Sora	*Porzana carolina*
Purple martin	*Progne subis*
Common bushtit	*Psaltriparus minimus*
Great-tailed grackle	*Quiscalus mexicanus*
Common grackle	*Quiscalus quiscula*
Virginia rail	*Rallus limicola*
American avocet	*Recurvirostra americana*
Ruby-crowned kinglet	*Regulus calendula*
Golden-crowned kinglet	*Regulus satrapa*
Bank swallow	*Riparia riparia*
Rock wren	*Salpinctes obsoletus*
Black phoebe	*Sayornis nigricans*
Eastern phoebe	*Sayornis phoebe*
Say's phoebe	*Sayornis saya*
Ovenbird	*Seiurus aurocapillus*
Northern waterthrush	*Seiurus noveboracensis*
Broad-tailed hummingbird	*Selasphorus platycercus*
Rufous hummingbird	*Selasphorus rufus*
American redstart	*Setophaga ruticilla*
Mountain bluebird	*Sialia currucoides*
Western bluebird	*Sialia mexicana*
Eastern bluebird	*Sialia sialis*
Red-breasted nuthatch	*Sitta canadensis*
White-breasted nuthatch	*Sitta carolinensis*
Pygmy nuthatch	*Sitta pygmaea*
Western burrowing owl	*Speotyto cunicularia hypugea*
Williamson's sapsucker	*Sphyrapicus thyroideus*
Yellow-billed sapsucker	*Sphyrapicus varius*
Dickcissel	*Spiza americana*
American tree sparrow	*Spizella arborea*
Brewer's sparrow	*Spizella breweri*
Chipping sparrow	*Spizella passerina*
Northern rough-winged swallow	*Stelgidopteryx serripennis*
Calliope hummingbird	*Stellula calliope*
Caspian tern	*Sterna caspia*

Appendix C continued. Common and Scientific Names of Birds That May Occur on the Navajo Nation.

Common Name	Scientific Name
Forster's tern	*Sterna forsteri*
Common tern	*Sterna hirundo*
Mexican spotted owl	*Strix occidentalis lucida*
Eastern meadowlark	*Sturnella magna*
Western meadowlark	*Sturnella neglecta*
European starling	*Sturnus vulgaris*
Tree swallow	*Tachycineta bicolor*
Long-billed marsh wren	*Telmatodytes palustris*
Bewick's wren	*Thryomanes bewickii*
Bendire's thrasher	*Toxostoma bendirei*
Brown thrasher	*Toxostoma rufum*
Violet-green swallow	*Trachycineta thalassina*
Lesser yellowlegs	*Tringa flavipes*
Greater yellowlegs	*Tringa melanoleuca*
Solitary sandpiper	*Tringa solitaria*
House wren	*Troglodytes aedon*
American robin	*Turdus migratorius*
Eastern kingbird	*Tyrannus tyrannus*
Western kingbird	*Tyrannus verticalis*
Cassin's kingbird	*Tyrannus vociferans*
Common barn-owl	*Tyto alba*
Orange-crowned warbler	*Vermivora celata*
Lucy's warbler	*Vermivora luciae*
Nashville warbler	*Vermivora ruficapilla*
Virginia's warbler	*Vermivora virginiae*
Warbling vireo	*Vireo gilvus*
Red-eyed vireo	*Vireo olivaceus*
Solitary vireo	*Vireo solitarius*
Gray vireo	*Vireo vicinior*
Wilson's warbler	*Wilsonia pusilla*
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*
Sabine's gull	*Xema sabini*
Mourning dove	*Zenaida macroura*
White-crowned sparrow	*Zonotrichia leucophrys*
Harris' sparrow	*Zonotrichia querula*

Appendix D. Common and Scientific Names of Mammals That May Occur on the Navajo Nation.

Common Name	Scientific Name
White-tailed antelope ground squirrel	*Ammospermophilus leucurus*
Pronghorn antelope	*Antilocapra americana*
Pallid bat	*Antrozous pallidus*
Ring-tailed cat	*Bassariscus astutus*
Coyote	*Canis latrans*
Beaver	*Castor canadensis*
Elk	*Cervus canadensis*
Gunnison's prairie dog	*Cynomys gunnisoni*
Ord's kangaroo rat	*Dipodomys ordi*
Banner-tailed kangaroo rat	*Dipodomys spectabilis*
Big brown bat	*Eptesicus fuscus*
Porcupine	*Erethizon dorsatum*
Spotted bat	*Euderma maculata*
Mountain lion	*Felis concolor*
Silver-haired bat	*Lasionycteris noctivagans*
Red bat	*Lasiurus borealis*
Hoary bat	*Lasiurus cinereus*
Blacktail jackrabbit	*Lepus californicus*
River otter	*Lutra canadensis*
Bobcat	*Lynx rufus*
Marten	*Martes americana*
Striped skunk	*Mephitis mephitis*
Long-tailed vole	*Microtus longicaudus*
Mexican vole	*Microtus mexicanus*
Montane vole	*Microtus montanus*
Meadow vole	*Microtus pennsylvanicus*
House mouse	*Mus musculus*
Long-tailed weasel	*Mustela frenata*
Black-footed ferret	*Mustela nigripes*
Mink	*Mustela vison*
California myotis	*Myotis californicus*
Western small-footed myotis	*Myotis ciliolabrum*
Long-eared myotis	*Myotis evotis*
Little brown myotis	*Myotis lucifugus*
Fringed myotis	*Myotis thysanodes*
Cave myotis	*Myotis velifer*
Long-legged myotis	*Myotis volans*
Yuma myotis	*Myotis yumanensis*
White-throated woodrat	*Neotoma albigula*
Bushy-tailed woodrat	*Neotoma cinerea*
Mexican woodrat	*Neotoma mexicana*

Appendix D continued. Common and Scientific Names of Mammals That May Occur on the Navajo Nation.

Common Name	Scientific Name
Stephen's woodrat	*Neotoma stephensi*
Desert shrew	*Notiosorex crawfordi*
Big free-tailed bat	*Nyctinimops macrotis*
Mule deer	*Odocoileus hemionus*
Muskrat	*Ondatra zibethica*
Northern grasshopper mouse	*Onychomys leucogaster*
Plains pocket mouse	*Perognathus flavescens*
Silky pocket mouse	*Perognathus flavus*
Brush mouse	*Peromyscus boylii*
Canyon mouse	*Peromyscus crinitus*
Rock mouse	*Peromyscus difficilis*
White-footed mouse	*Peromyscus leucopus*
Deer mouse	*Peromyscus maniculatus*
Piñon mouse	*Peromyscus truei*
Western pipistrel	*Pipistrellus hesperus*
Townsend's big-eared bat	*Plecotus tounsendii*
Raccoon	*Procyon lotor*
Western harvest mouse	*Reithrodontomys megalotis*
Abert's squirrel	*Sciurus aberti*
Merriam shrew	*Sorex merriami*
Dwarf shrew	*Sorex nanus*
Vagrant shrew	*Sorex vagrans*
Spotted ground squirrel	*Spermophilus spilosoma*
Rock squirrel	*Spermophilus variegatus*
Western spotted skunk	*Spilogale gracilis*
Desert cottontail rabbit	*Sylvilagus audoboni*i
Eastern cottontail rabbit	*Sylvilagus floridanus*
Nuttall's cottontail rabbit	*Sylvilagus nuttali*i
Mexican free-tailed bat	*Tadarida brasiliensis*
Cliff chipmunk	*Tamias dorsalis*
Least chipmunk	*Tamias minimus*
Colorado chipmunk	*Tamias quadrivittatus*
American red squirrel	*Tamiasciurus hudsonicus*
Badger	*Taxidea taxus*
Botta's pocket gopher	*Thomomys bottae*
Gray fox	*Urocyon cinereoargenteus*
Black bear	*Ursus americanus*
Kit fox	*Vulpes macrotis*
Swift fox	*Vulpes velox*
Red fox	*Vulpes vulpes*
Northern pocket gopher	*Thomomys talpoides*

Appendix E. Common and Scientific Names of Amphibians and Reptiles That May Occur on the Navajo Nation.

Common Name	Scientific Name
Amphibians	
Tiger salamander	*Ambystoma tigrinum*
Great Plains toad	*Bufo cognatus*
Red-spotted toad	*Bufo punctatus*
Woodhouse's toad	*Bufo woodhousii*
Canyon treefrog	*Hyla arenicolor*
Western chorus frog	*Pseudacris triseriata*
Bullfrog	*Rana catesbeiana*
Northern leopard frog	*Rana pipiens*
Plains spadefoot	*Scaphiopus bombifrons*
Western spadefoot	*Spea hammondii*
Reptiles	
Chuckwalla	*Sauromalus obesus*
Collard lizard	*Crotophytus collaris*
Longnose leopard lizard	*Crotophytus wislezenii*
Lesser earless lizard	*Holbrookia maculata*
Eastern fence lizard	*Sceloporus undulatus*
Desert spiny lizard	*Sceloporus magister*
Common sagebrush lizard	*Sceloporus graciosus*
Ornate tree lizard	*Urosaurus ornatus*
Common side-blotched lizard	*Uta stansburiana*
Short-horned lizard	*Phrynosoma douglassi*
Little striped whiptail	*Cnemidophorus inornatus*
Western whiptail	*Cnemidophorus tigris*
Plateau striped whiptail	*Cnemidophorus velox*
Desert night lizard	*Xantusia vigilis*
Many-lined skink	*Eumeces multivirgatus*
Smooth green snake	*Ophedrys vernalis*
Ring-neck snake	*Diadophis punctatus*
Striped whipsnake	*Masticophis taeniatus*
Coachwhip	*Masticophis flagellum*
Racer	*Coluber constrictor*
Corn snake	*Elaphe guttata*
Gopher snake	*Pituophis melanoleucus*
Milk snake	*Lampropeltis triangulum*
Common king snake	*Lampropeltis getulus*
Longnose snake	*Rhinocheilus lecontei*
Western terrestrial garter snake	*Thamnophis elegans*
Common garter snake	*Thamnophis sirtalis*
Blackneck garter snake	*Thamnophis cyrtopsis*

Appendix E continued. Common and Scientific Names of Amphibians and Reptiles That May Occur on the Navajo Nation.

Common Name	Scientific Name
Western blackhead snake	*Tantilla planiceps*
Night snake	*Hypsiglena torquata*
Glossy snake	*Arizona elegans*
Western rattlesnake	*Crotalus viridis*
Western diamondback rattlesnake	*Crotalus atrox*
Mountain patch-nosed snake	*Salvadora grahamiae*

Appendix F. Other Common and Scientific Names of Animals Mentioned in this Report.

Common Name	Scientific Name
"tuna"	*Auxis, Euthynnus, Katsuwonus or Thunnus spp.*
"loon"	*Gavia spp.*
"pike"	*Esox spp.*
"swordfish"	*Xiphias gladius*

SAMPLING AND ANALYSIS PLAN FOR

NAVAJO NATION LAKE FISH AND WATER QUALITY MONITORING: 2003-2004

Revision 2
April 15, 2003

Prepared for the Navajo Nation Environmental Protection Agency as part of the *Multi Media Compliance Assurance Resources for Activities in Indian Country-United States Environmental Protection Agency Project Grant* by:

United States Fish and Wildlife Service,
New Mexico Ecological Services Field Office and
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CONCURRENCES AND APPROVALS

FOR THE NAVAJO NATION

_____ _____
Director, Navajo Nation Environmental Protection Agency Date

_____ _____
Program Manager, NNEPA Water Quality Program Date

_____ _____
Principal Investigator, NNEPA Water Quality Program Date

FOR THE US ENVIRONMENTAL PROTECTION AGENCY

_____ _____
Project Officer, Office of Planning and Public Affairs Date

_____ _____
Quality Assurance Manager, Quality Assurance Office Date

FOR THE FISH AND WILDLIFE SERVICE

_____ _____
Assistant Regional Director, Region 2, Ecological Services Date

_____ _____
State Supervisor, New Mexico Ecological Services Field Office Date

_____ _____
Project Leader, New Mexico Fisheries Resources Office Date

_____ _____
Project Officer, New Mexico Ecological Services Field Office Date

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF APPENDICES

DISTRIBUTION LIST

Navajo Nation

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SAMPLING AND ANALYSIS PLAN FOR

NAVAJO NATION LAKE FISH AND WATER QUALITY MONITORING: 2002-2003

1.0 QUALITY ASSURANCE PROJECT PLAN (QAPP)

1.1 Introduction

The Navajo Nation Environmental Protection Agency (NNEPA) is charged with protecting the environment of the Navajo Nation. In April 1995, the Navajo Nation Council passed the Navajo Nation Environmental Policy Act, which provides guidance for NNEPA and instills Navajo philosophy regarding environmental protection. The mission of NNEPA is to protect, preserve, and enhance the environment for present and future generations, with respect to Dine values, by developing, implementing, and enforcing environmental laws; and to foster public awareness and cooperation through education.

The Navajo Nation has primary responsibility for protecting its members from the health risks of consuming contaminated fish and wildlife. One way to do this is to issue fish consumption advisories for the general population, including recreational and subsistence fishers, as well as for sensitive subpopulations (such as pregnant women, nursing mothers, and children). Fish consumption advisories are intended to inform people of high concentrations of chemical contaminants (e.g., mercury) where they have been found in local fish. Such advisories can include recommendations to limit or avoid consumption of certain fish species from specific waterbodies.

Contamination of aquatic resources, including freshwater fish, has been documented in the scientific literature for many regions of the United States (Schmitt and Brumbaugh 1990, Brumbaugh *et al.* 2001). Environmental concentrations of some pollutants have decreased over the past 25 years as a result of better water quality management practices. However, environmental concentrations of some heavy metals, pesticides, and toxic organic compounds have increased due to intensifying urbanization, atmospheric discharges, industrial development, and use of new agricultural chemicals. The Navajo Nation's waterbodies are among the ultimate repositories of pollutants released from these activities. Pollutants may come from point source discharges (e.g., industrial and municipal facilities), accidental spill events, and nonpoint sources (e.g., atmospheric deposition from various combustion and incineration processes). Once these contaminants reach surface waters, they may concentrate through aquatic food chains and bioaccumulate in fish tissues. Thus, fish tissue monitoring serves as an important indicator of water quality problems, and several states and tribes routinely conduct chemical contaminant analyses of fish tissues as part of their comprehensive water quality monitoring programs (Cunningham and Whitaker 1989). Tissue contaminant monitoring can also enable tribal agencies to detect levels of contamination in fish tissue that may be harmful to humans or wildlife.

The goal of the Navajo Nation Lake Fish and Water Quality Monitoring Project is to provide data that may be used to evaluate mercury risks to human health and bald eagles on the Navajo Nation. This data could also be used to develop site-specific bioaccumulation factors and

evaluate the need for reduced mercury emissions and discharges under the Navajo Nation Clean Water Act (NNCWA) or other authorities. This Sampling and Analysis Plan (SAP) presents the organization, objectives, functional activities, and specific quality assurance (QA) and quality control (QC) activities associated with the fish and water quality monitoring for mercury that will be conducted. The SAP also describes the specific protocols that will be followed for sampling, sample handling and storage, chain-of-custody, and laboratory analyses.

1.1.1 Purposes

The primary purposes of this study are: 1) to document the concentrations of mercury, methyl mercury, and other trace elements in fish consumed by people and wildlife; and, 2) to document the concentrations of selected trace elements in lake water of selected lakes of the Navajo Nation. Results of this study will potentially provide insight into the ecological and human health risks associated with consumption of fish from selected lakes in relation to water-chemistry conditions.

The purpose of this SAP is to ensure that data collected during the sampling program are of adequate quality to: 1) determine the fish quality in selected fishing lakes on the Navajo Nation; and, 2) to determine the concentrations of selected trace elements and mercury in lake water. The QAPP portion of the SAP (Section 1.0) describes the procedures, which will be used to document and report precision, accuracy and completeness of the analytical and environmental measurements of the lake fish- and water-quality assessment.

1.1.2 Scope

The scope of this assessment includes the collection, analysis and interpretation of surface-water and fish-quality data within selected lakes on the Navajo Nation. Four lakes known to be used either for fishing, or used by bald eagles as a prey base, were selected through consultation with the Navajo Nation Natural Heritage Program's Department of Fish and Wildlife. The actual number of lakes sampled may change due to the availability of fish species found in each lake. The proposed four lakes selected to be sampled are:

1) Wheatfields Lake (WF), coldwater lake;
2) Whiskey Lake (WL), coldwater lake;
3) Red Lake (RL), warmwater lake; and
4) Morgan Lake (ML), warmwater lake.

Samples of fish species: 1) known to be present in these lakes, and 2) known to be consumed by humans and bald eagles, will be taken. From each lake we will collect 4 composite samples of 5 fish (4 composite samples of channel catfish [*Ictalurus punctatus*] or 4 composite samples of largemouth bass [*Micropterus salmoides*] from warmwater lakes [depending on their relative availability]; and 4 rainbow trout [*Oncorhynchus mykiss*] from coldwater lakes), 3 samples of composited, filtered surface water for trace elements, and 3 samples of unfiltered surface water for mercury analyses.

All sampling activities will take place as a one-time sampling activity during March 2003, when eagles have migrated north. The analytical results should ready by September 2003. A draft final report will be ready for review in March 2004. A final report will be available for review in mid June 2004. Thirty unbound copies of the report, and thirty CD ROMs containing electronic copies of the report and raw data will be provided to the NNEPA by September 2004.

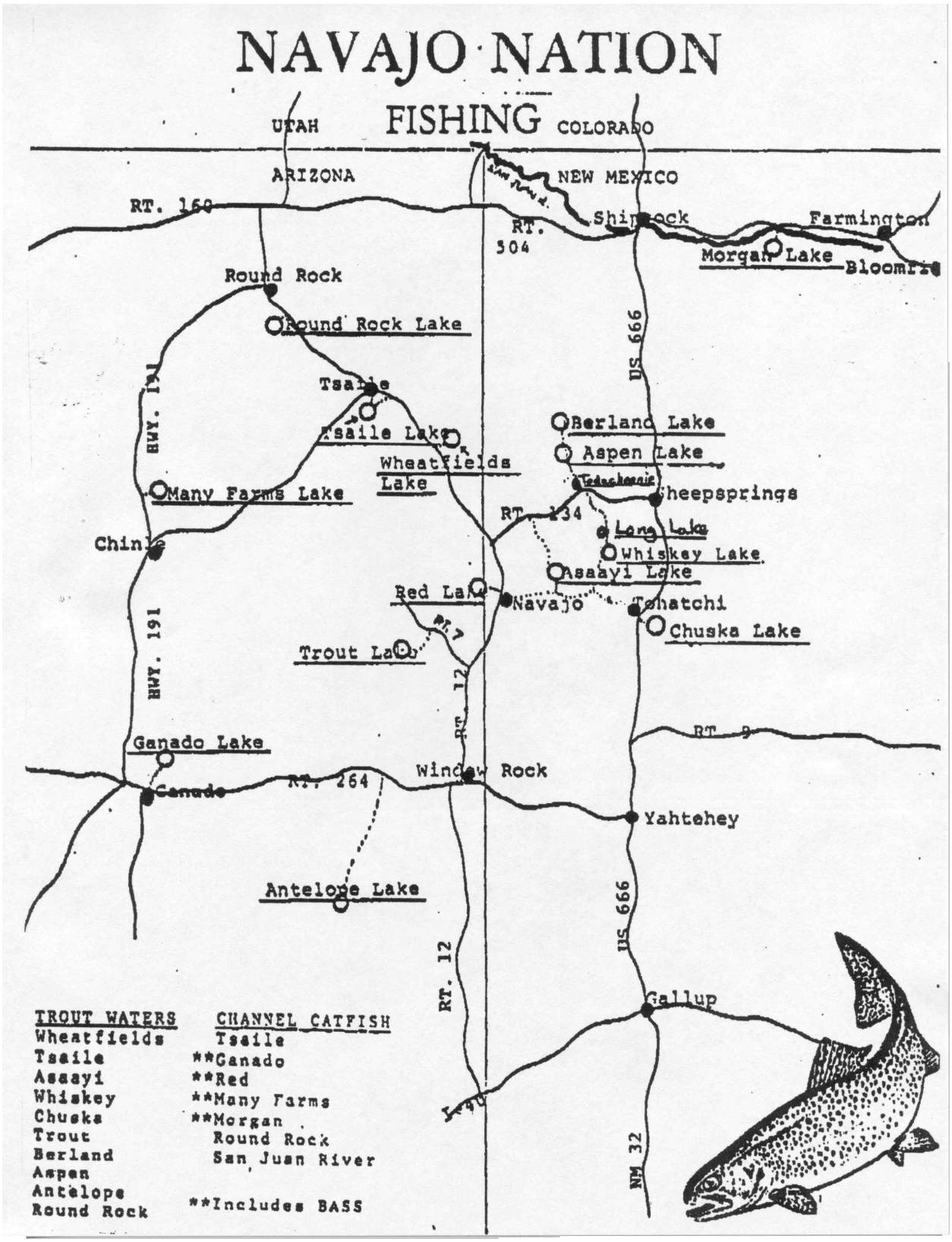

Figure 1.1.2.1.--Location of fishing lakes on the Navajo Nation.

1.2 Project Description

This project will collect requisite data for the description of trace-element contaminants in water and fish collected from selected fishing lakes on the Navajo Nation.

1.2.1 Project background

The Navajo Nation has primary responsibility for protecting its members from the health risks of consuming contaminated fish and wildlife. The Navajo Nation has proposed collecting information to determine whether to issue fish consumption advisories for the general population, including recreational and subsistence anglers, or for sensitive subpopulations (such as pregnant women and children). Such fish consumption advisories could include recommendations to limit or avoid consumption of certain fish species from specified waterbodies or, in some cases, from specific waterbody types (e.g., inland lakes, streams).

In 2002, the United States Environmental Protection Agency (USEPA; A. Strauss, Region 9, written communication) stated that it would approve the mercury criterion in the Navajo Nation Water Quality Standards (NNWQS) if the Navajo Nation adopted a human health methylmercury tissue-based criteria during the next triennial review. The Navajo Nation EPA agreed to revise the current NNWQS mercury criteria and meet the USEPA requirements.

It should be noted however, that adoption of the recommended human health criterion for mercury still may not be considered to be sufficiently protective of the potential for maternal transfer of mercury to bald eagle eggs and embryos. Developing embryos of birds are considered extremely sensitive and vulnerable to relatively minute concentrations of mercury in the egg. Scheuhammer (1987) reported that reproductive effects in birds typically occur at twenty percent of the dietary concentrations that produce lethal effects in adult birds. Therefore, the United States Fish and Wildlife Service (USFWS) and USEPA have agreed to utilize their authorities to help the Navajo Nation monitor the prey base of the bald eagle for mercury concentrations in order to allow for the development of site-specific bioaccumulation factors. Development of these factors will assist in assessing mercury exposure risk to bald eagles throughout the Navajo Nation.

1.2.2 Project objectives

The sampling program is designed to collect representative fish and water samples to accurately represent the concentrations of mercury available for consumption by anglers or bald eagles and to evaluate the water-resource conditions of selected inland fishing lakes. This SAP was written in accordance with USEPA Order 5360.1, Policy and Program Requirements to Implement the Mandatory Quality Assurance Program. In this study the USFWS will implement the fish and water sampling program to collect and analyze fish tissue and surface-water quality samples. Fish and water samples collected from four fishing lakes will be analyzed for parameters listed in Table 1.2.1.2 ***(listed metals are included as a fixed price analyte "suite")***. Laboratory analyses will be performed by the Trace Element Research Laboratory (TERL) in College Station, Texas. These fishing lakes *may* also be monitored for some or all of the following: specific conductance; pH; temperature; turbidity; and dissolved oxygen; and hardness.

Metal data, ***when applicable,*** will be compared to the cold and warm water criteria found in Table 206B.5 of the Navajo Nation Water Quality Standards (NNWQS 1999). Since many of these standards are hardness dependent, it is necessary to analyze sampled surface waters for hardness as well.

Table 1.2.1.2.— TERL method, parameter, and estimated instrument detection limit (e-IDL) for water and fish samples collected. [Critical laboratory analyses will be performed by Trace Element Research Laboratory, see Appendix A for method description. Actual method detection limits are sample dependent and will vary by sample matrix. Abbreviations: µg/L, micrograms per liter; mg/kg, milligram per kilogram; SOP; standard operating procedure, NA; not analyzed.]

Method	**Parameters**	**Sample matrix (e-IDL)**	
(See Appendix A)		**Water**	**Tissue**
TERL SOP-9030 USEPA 1638 for water samples	Inductively coupled plasma mass spectroscopy for water samples	µg/L	mg/kg
TERL SOP-9041 USEPA 200.7 for fish samples	Inductively coupled plasma atomic emission spectroscopy for fish samples		
	Aluminum	0.05	0.8
	Barium	0.01	0.4
	Boron	11	1
	Cadmium	0.01	0.04
	Chromium	0.05	0.2
	Copper	0.03	0.3
	Iron	14	4
	Magnesium	NA	4
	Manganese	0.01	0.4
	Molybdenum	0.05	1.6
	Nickel	0.02	2.4
	Lead	0.01	0.4
	Vanadium	0.02	0.1
	Zinc	0.07	0.08
TERL SOP-9050 USEPA 1631	Atomic fluorescence spectroscopy for fish and water samples		
	Arsenic	0.2	0.2
	Selenium	0.2	0.5
TERL SOP ST16 USEPA 245.5 & 245.6	Cold-vapor atomic absorption spectroscopy for fish and water samples		
USEPA 1631 for water	Mercury	***0.002***	0.02
TERL SOP 9712 for fish ***USEPA 1631 for water***	Methyl mercury	***0.0005***	0.02
USEPA 200.7	Hardness (Ca and Mg) total as calcium carbontae	1.0 mg/L	NA

This study will result in the collection of fish tissue and water-quality data in order to gain a better understanding of the conditions and fish-quality found in selected lakes on the Navajo Nation. The receptors of concern are piscivorous eagles and the fishing public. The pathways for potential contaminant release are mostly through the food web and through surface water. Only surface-water and food pathways will be investigated in this study.

1.2.3 Data quality objectives and management specifications

The *Navajo Nation Lake Fish and Water Quality Study* is not a regulatory investigation. Rather, the primary intent of data collection is to determine the current condition of fish quality in relation to surface-water resources and to provide scientists and water managers with scientific credibility in the consideration of fish consumption advisories within the area of study. Specifically, the mean concentrations of the chemicals listed in table 1.2.1.2 found in fish tissues will be compared to the USEPA screening values ***(where available),*** for consideration by the NNEPA of appropriate fish advisories. Refer to Section 1.9.4 of this document for a more detailed discussion of data interpretation.

To accomplish this, all data collected should be of adequate quality and organization to effectively communicate with respective land and water management and regulatory agencies in terms of jurisdictional authority. This requires that a broad spectrum of data analysis, management and interpretation be incorporated early in the assessment process by the USFWS and NNEPA.

Data Quality Objectives (DQOs) and measurement performance criteria for each activity in the project are addressed in this document. Primary considerations include: the intended uses of the data, type and quantity of the data, the parameters of interest (i.e. mean, range, etc.), the geographic study area, and time period. All data collection activities associated with the scheduled assessment process requires that standardized quality assurance/quality control protocol and procedures be followed. Conditions under which data are to be collected, organized and managed has been standardized and formally described utilizing provisions detailed in subsequent sections of this document.

1.3 Project Organization and Responsibilities

The NNEPA Water Quality Program and the USFWS New Mexico Ecological Services Field Office share project management and responsibilities, in accordance with a Memorandum of Agreement. These responsibilities include study design, data-collection activities, data management and interpretation activities, training, reporting, and fiscal management.

1.3.1 Responsibilities of the NNEPA Water Quality Program

The primary responsibilities of the NNEPA Water Quality Program are to: accurately define the scope and limitations of the project; identify the scenario parameters for the human health and ecological risk assessment; participate in all data-collection activities; participate in all training or presentations; provide translation or answer to members of the Navajo Nation as requested; and, co-author or provide review and comments on all interim and final reports published by the USFWS.

The Principal Investigator for the Navajo Nation Lake Fish and Water Quality Monitoring is Mr. Eric Rich, Hydrologist II, of the NNEPA Water Quality Program. Mr. Rich represents the single point of contact for all activities conducted under the Navajo Nation Lake Fish and Water

Quality Monitoring. The mission of the NNEPA Water Quality Program is to ensure the "waters of the Navajo Nation" attain, support, and maintain designated uses of these waters.

1.3.2 Responsibilities of the U.S. Fish and Wildlife Service

The primary responsibilities of the USFWS New Mexico Ecological Services Field Office are to: administer the collection and preliminary interpretation of environmental data collected during the course of the project; provide required elements of quality assurance and quality control for all data-collection activities; provide both formal and "hands-on" training to personnel of the Navajo Nation in all aspects of project implementation; interpret and report the data within the scope of the Memorandum of Agreement.

The USFWS Project Manager for the Navajo Nation Lake Fish and Water Quality Monitoring is Dr. Joy E. Nicholopoulos, Field Supervisor, of the New Mexico Ecological Services Field Office or her designee. Dr. Nicholopoulos is responsible for all project management and deliverables. The Project Officer for the Navajo Nation Lake Fish and Water Quality Monitoring is Mr. Joel D. Lusk, Senior Environmental Contaminants Biologist, of the New Mexico Ecological Services Field Office. The Project Officer will oversee all aspects of the project including: training and supervising all project team members to ensure compliance with field data- and sample-collection procedures described or cited in this document, and with field instrument calibration, operation, and maintenance procedures prescribed by the manufacturers; scheduling and ensuring collection of field quality control samples; reviewing all results of laboratory analyses; reporting verbally, through interim and draft reports, presentations, and technical reports to the NNEPA Water Quality Program on all project related matters.

Additional USFWS Field Project Leaders are Mr. James E. Brooks and Jason E. Davis, fishery biologists of the New Mexico Fishery Resources Office. Mr. Brooks and Mr. Davis are responsible for all transportation needs, provision of any necessary fish collection gear, electrofishing and boating equipment and supplies, electrofishing and boating safety, fish collection and identification, assistance with fish dissection and records, assistance with water quality measures, and coordination with the Arizona Fishery Resources Office. Mr. Lusk, Mr. Davis, other USFWS employees, volunteers, and agency personnel of the Navajo Nation will conduct all field activities.

1.3.3 Identification of subcontractors and their tasks

The New Mexico Ecological Services Field Office will contract laboratory services through the USFWS Patuxent Analytical Control Facility (PACF). The PACF is a USFWS Field Station of the Division of Environmental Quality located at the Patuxent Wildlife Research Center in Laurel, Maryland. The contact at PACF is Mr. John Moore (301-497-5680). The PACF provides analytical chemistry services to the USFWS. The PACF maintains the Environmental Contaminants Data Management System (ECDMS), a database that stores sample collection and analytical data. The PACF establishes and maintains contracts with several laboratories. The USFWS will provide PACF with a catalog, through the ECDMS, which describes the samples to be analyzed, the analyses requested, and the cost code from which funds will be used for payment. The PACF selects the contract laboratory for analyses, handles the procurement, and

authorizes the client to ship the samples. Upon completion of the analysis, the contract laboratory sends the analytical report to PACF; it is reviewed by the PACF Quality Assurance Team for conformance to the PACF QA Criteria. If the report is acceptable, the results are sent to the client. Problems are referred back to the contract laboratory for corrective action. Catalogs submitted through ECDMS are electronically reported to the client and the data are stored in the database. The PACF will be responsible for assuring the quality of the chemical analyses it provides through the contract laboratory, Trace Element Research Laboratory. The quality of a chemical analysis is considered assured when the analysis is performed in a technically competent manner, by qualified personnel using appropriate methods and equipment, and the precision and accuracy of the measurement are within the expected ranges for the technique.

Contact information for contract laboratory services is:

Mr. Robert Taylor, PhD.
Trace Element Research Laboratory (TERL)
Texas A&M Research Foundation - Department of Oceanography
100 Bizzell Street
Eller Building, Room 403
College Station, TX 77843-3146
(979) 845-9442

Descriptions of the processes used to evaluate this laboratory's capability are included in Appendices A and B. Should the analytical services of the TERL be of inadequate quality or prompt in the analysis, the USFWS will identify an alternative analytical laboratory.

1.3.4 Project Fiscal Information

The NNEPA has prepared an application for a grant totaling $53,000.00 offered by the USEPA in order to evaluate the need for fish consumption advisories on waters of the Navajo Nation. Under a Memorandum of Agreement, the Navajo Nation would contract with the USFWS to conduct the Navajo Nation Lake Fish and Water Quality Monitoring Project. Anticipated project costs are:

USFWS Personnel (including number of staff days)		
NMES Contaminant Biologist (20 days @ $650 per day)	$13,000.00	
Fishery Resource Offices (8 days @ $250 per day)	$6,000.00	
Subtotal		$19,000.00
Travel/Per Diem		
8 trips (scoping, field work, and presentations)	$3,000.00	
Subtotal		$3,000.00
Laboratory Services (TERL)		
Water Analyses ($407 each)	$7,333.00	
Fish Tissue Analyses ($676 each)	$9,390.00	
		$16,123.00
Equipment and Supplies		
Equipment (bottles, churns, bottles, foil, etc.)	$3,000.00	
Supplies (buffers, standards, shipping, etc.)	$1,277.00	
Subtotal		$4,277.00
Administrative Overhead (20 %)		$10,600.00
GRAND TOTAL		$53,000.00

1.4 Quality Assurance Objectives for Measurement Data

The objective of the project QAPP is to monitor the overall program for all environmentally related data collection and analyses to ensure that all data generated are suitable for evaluation and interpretation of fish tissue and water quality at the fishing lakes. The QAPP is divided into two major parts; overall program quality assurance/quality control (QA/QC) and laboratory QA/QC. Oversight of the overall program QA/QC is the responsibility of the Project Officer. Laboratory QA/QC is the responsibility of the PACF and TERL QA/QC manager. This section defines the recommended QA objectives or goals for accuracy, precision, completeness, representativeness, and comparability. These goals present the acceptable standards that field

and laboratory teams must plan to meet before sampling begins. Because the effectiveness of a quality assurance program generally is measured by the quality of data generated by the laboratory, much of what is presented in this SAP applies to laboratory operations, although, specific procedures to be used in the field are also described.

Quality assurance will be emphasized and carried out conscientiously by following procedures in this SAP that will prevent the introduction of contaminants into fish and water samples and that will chemically stabilize any samples before laboratory analyses. Additionally, field instruments will be calibrated frequently and checked against concentration standards. Laboratory data will be examined relative to QA/QC sampled data. All laboratory detection limits are sufficient and less than screen levels.

1.4.1. Definition of Criteria

The effectiveness of a QA program is measured by the quality of data generated. Data quality is judged in terms of its accuracy, precision, completeness, representativeness, and comparability. These terms are described as follows:

Accuracy - the degree of agreement of a measurement with an accepted reference or true value, usually expressed as the difference between the two values, or the difference as a percentage of the reference or true value. Accuracy is a measure of the bias in a system.

For the field measurements, with the exception of location, the true value is dependent on the calibration of the instrument (ruler or scale). Following calibration procedures and precision requirements will provide an indication of accuracy. Following SOPs as written should reduce contamination as much as possible. Accuracy is also based on training. Accuracy of field measurements will be evaluated by:

a) standard methods - methods of measurement shall be used which, whenever possible, are recognized and considered as standard by the scientific community.

b) calibration and calibration checks of field instruments and equipment shall be performed at a frequency that will insure measurement is accurate.

c) collection of field blanks for water analyses.

Accuracy of laboratory analytical data will be evaluated by:

a) standard methods - methods of measurement shall be used which, whenever possible, are recognized and considered as standard by the scientific community. USEPA methods, generally, shall be used.

b) calibration standards - primary standards shall be obtained from NIST (National Institute of Standards and Technology) USEPA repository, or other reliable commercial sources.

c) surrogate spikes - recovery of organic surrogate analytes shall be within three standard deviations of the laboratory-established average recovery of the surrogate analyte.

d) known laboratory control samples - recovery of analytes shall be within three standard deviations of the laboratory-established average recovery of the analyte, not to exceed the range specified by the SW-846 methods. For multi-analyte method, 95 percent of the analytes must be within control limits.

e) frequency that will insure measurement is accurate.

The determination of the accuracy of a measurement requires knowledge of the true or accepted value for the signal being measured Accuracy may be calculated in terms of percent recovery as follows:

$$Percent\ recovery \equiv \frac{X}{T} \times 100$$

where: X = the observed value of measurement
T = "true" value

Precision - the degree to which the measurement is reproducible. Precision is a measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Another term for precision is repeatability. Repeatability in the field is very important to precision, as well as data comparability. Repeatability is controlled by the development of detailed SOPs and adequate training in those SOPS. Field precision will be checked by remeasuring 10% of the samples. Precision is best expressed in terms of the standard deviation. Standard deviation (S) is calculated as follows:

$$S \equiv \frac{1}{n-1} \sum_{i-1}^{n} \left(x_i - \overline{x} \right)^2$$

where a quantity "x" (e.g., a concentration) is measured "n" times.

Precision of laboratory analytical data will be evaluated by:

a) duplicate control samples (DCS) - replicate analyses of analytes shall be within laboratory established control limits.

b) matrix spike duplicates - agreement between duplicate analyses of inorganic spiked analytes shall be within the relative percent difference (RPD) limits specified in SW 846, Third Edition (USEPA 1986a) unless otherwise specified.

In the case of duplicates, the RPD between the two samples may be used to estimate precision.

$$RPD \equiv \left| \frac{D_1 - D_c}{(D_1 + D_c)/2} \right| \times 100$$

where: RPD = relative percent difference
D_1 = first sample value
D_2 = second sample value (duplicate)

Completeness - a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. In the field, completeness is defined as the successful collection of all viable samples in the appropriate time frame. A viable sample would be defined as any single sample whose integrity has not been affected during the collection process and would therefore not be flagged with a field qualifier.

The DQOs are based on the evaluation of a statistically relevant number of samples, which are affected by all errors occurring in the field and laboratory. Therefore, the overall ***goal*** is a completeness of 95***%. The goal will be to have*** at least 95 percent of the laboratory analytical batches associated with acceptable QC results. ***The goal will aslo be to have*** at least 95 percent of the laboratory analytical methods in control and at least 95 percent of the analytes in control for a method to be in control.

The percent completeness for each set of samples is calculated as follows:

$$Completeness = \frac{valid\ data\ obtained}{total\ data\ planned} \times 100$$

Completeness of field data will be evaluated by:

a) all measurements and observations shall be recorded on logsheets in a notebook and reviewed in terms of stated goals.

b) all deviations from the SOPs shall be recorded and documented.

Completeness of laboratory analytical data will be evaluated by:

a) each data set (batch) shall contain all QC check analyses verifying precision and accuracy for the analytical protocol and shall be reviewed in terms of stated goals.

b) each data set (batch) shall contain all field and trip blank analyses.

c) all pertinent dates are recorded (dates received, extracted, analyzed, etc.).

d) all requested analyses shall be performed or documentation provided as to the reason for nonperformance.

Representativeness - the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition.

Representativeness of field data will be evaluated by:

a) use of standard methods of measurement and sample collection.

b) collection of sufficient size or amount of sample.

c) documentation of reasons for use of nonstandard techniques.

d) adherence to chain-of-custody procedures.

Representativeness of laboratory analytical data will be evaluated by:

a) use of preservation techniques (including chilling during shipment) to minimize sample degradation which may occur between sample collection and sample analysis.

b) holding times prescribed by 40 CFR 136 shall be adhered to by the analytical laboratory.

c) field and laboratory blank analyses will be used to determine if samples have been contaminated.

Comparability - express the confidence with which one data set can be compared to another using the same property. Comparability will be maintained by the adherence to the SOPs. Adherence to these SOPs by all samplers will allow for comparability of data among sites and throughout the project.

Comparability of field measurements will be evaluated by:

a) standard methods - methods of measurement shall be used which, whenever possible, are recognized and considered as standard by the scientific community.

b) reporting units - data shall be consistently reported in units recognized and considered as standard by the scientific community.

Comparability of laboratory analytical data will be evaluated by:

a) standard methods - methods of analysis shall be used which are recognized and considered as standard by the scientific community. USEPA methods are generally used.

b) reporting units - data shall be consistently reported in units recognized and considered standard by the scientific community.

c) the use of traceable materials for calibration and quality control.

1.4.2 Goals

The numerical QA goals for measured data are as follows:

	PARAMETER	ACCURACY	PRECISION	COMPLETENESS
1	Analytes (laboratory) in water or fish	+ or - 3 standard deviations (sigmas) of known standard concentrations	RPD within laboratory determined control limits	95%

Failure to achieve these criteria shall require additional analysis or other agreed upon action.

1.4.3 Second Order Data

Second order data is defined as information and/or data acquired from any source outside of the USFWS study described in this SAP that may impact the environmental decision making process (i.e. where to sample, what to sample for). Second order data may include literature reviews and historical data assembled by the USFWS relevant to the assessment, as well as other data collected during the study by other Federal, Tribal, State or other entities.

Examples of second order data may include the following:

- Fish stocking records;
- Limnological surveys of these lakes;
- Maps or aerial photographs of lakes depicting wetlands;
- Reports of piscivorous bird usage;
- Computer databases;
- Numerical simulations (models);
- Spreadsheets and programs;
- Literature; and
- Other sampling events (i.e. historical data collected by USFWS prior to this study).

Issues that shall be addressed when using second order data include, but are not limited to the following:

- Source of the generated data;
- How the data will be used (i.e., what decisions affecting data quality will be made based upon the data); and
- The quality of the data;

- If the data were generated under an approved QAPP or other appropriate sampling document, this will be stated and the document will be referenced by title, date, preparing organization, and approving organization;
- If the quality of the data is unknown or uncertain, this will be stated and any limitations on the use of the data will be indicated; and
- If the data are obtained from the only available source, this will be stated, a description of any information known or not known about the quality of the data will be included, and any limitations on the use of the data will be indicated.

When using second order data, all available detail regarding the data will be provided to allow the user of this information to understand how it was determined that the acquired data is acceptable for use in decision making. In determining if the data are acceptable, the following information will be considered:

- representativeness of the data;
- bias;
- precision; and
- qualifiers associated with the data.

1.5 Sampling Procedures

Standardized sampling, handling, and analysis procedures will be followed Documented procedures/protocols are identified in the following sections.

1.5.1. Sampling protocols

Specific sampling procedures that will be followed for the collection of fish and water samples are described in Section 2.0 of this SAP. General sampling procedures follow methods described in the technical documents referenced in Section 3.0 of this SAP.

1.5.2. Sampling handling

The required sample volume, preservation, and analytical holding times by method for fish and water samples are presented in Table 1.5.2.1.

Table 1**.5.2.1. Sample type, preparation, containers, holding times, and analyses.**

Sample Type	Preparation	Preservative	Container	Holding Time	Analysis
Fish	length and weight measured, spines removed	cold/frozen	plastic bags	6 months	trace elements
Fish fillet	skin removed and weight measured	cold/frozen	500 mL, chemically clean glass jar	1 month	methyl mercury, trace elements
Water	filtered though inline 0.45 µm	prepreserved ultra pure HNO3	500 mL, Nalgene jar	6 months	trace elements
Water	clean hands / dirty hands	prepreserved Omni Trace 1 % HCl	1 L, rigorously cleaned, Teflon container	1 month	methyl mercury
Water	none	none	none	none	field measurements
Water	none	prepreserved HNO3	500 ml, Poly	6 months	hardness

1.6 Sample Custody

1.6.1 Field operations

Sample handling and custody procedures for the field investigation will be discussed in sections 2.2.2 and 2.2.3 of the field sampling plan (section 2.0 of this document).

1.6.2 Laboratory operations

Laboratory procedures for sample handling, sample identification and sample custody are discussed in the following subsections.

1.6.2.1 Sampling handling and custody

Samples received by the laboratory are carefully checked for label identification, chain-of-custody, and any discrepancies. Photographs document the condition of samples and each sample is then assigned a unique laboratory identification number, which stores all identifications and essential information. These internal chain-of-custody procedures track the sample from storage through the laboratory system until the analytical process is complete and

the sample is submitted for disposal or returned to the client. Access to the laboratory is restricted to prevent any unauthorized contact with samples, extracts or documentation.

1.6.2.2 Sample identification

Each sample collected is uniquely identified by an six digit alphanumeric sample identification number. The field number, whether a water or fish sample, is assigned by the USFWS Project Officer. This number is unique in that it applies specifically to a given sample site and to no other. The number usually is assigned when a sampling site is first established and is retained for that sampling site indefinitely. The first two digits denote the site initials; the next two digits denote the sample type; and the last two digits (assigned sequentially) uniquely identify the sample number. Samples are further uniquely identified by their weight and date they were collected. Field blank and duplicate water samples will also be uniquely identified by a field sample identification number.

1.7 Calibration Procedures and Frequency for Field Test Equipment

Field measurement of water quality conditions are non critical. However, field equipment calibration procedures and frequency are discussed in Section 2.3.2 of the Field Sampling Plan (Section 2.0 of this document).

1.8 Analytical Procedures

1.8.1 Identification of methods

Methyl mercury in fish samples will be analyzed by cold vapor atomic absorption spectroscopy. Remaining trace elements in fish and water samples will be analyzed by the methods detailed in Table 1.2.1.2 and Appendix A.

1.8.2 Analytical detection limits and quality control

The sensitivity of an analytical method is related to the detection limit which is the lowest concentration of an analyte that can be detected at a specific confidence level (detection levels are listed in Table 1.2.1.2). Quality control samples will be processed in a manner identical to actual samples, and include reagent blanks, spiked blanks, duplicates, and spiked samples. Blank levels will be no more than 2x method detection limit (MDL). If blank levels for any analyte are above the 2x MDL, samples analyzed in that sample set should be reprocessed after the source of contamination is isolated. At least one reagent blank is analyzed with each batch of samples. Percent recovery of the spike is calculated and used as a measure of accuracy. Matrix spikes are used to investigate possible interferences that may result in either signal enhancement or suppression. Samples are spiked with methylmercury at levels higher than expected. Matrix spikes consist of at least 5% of the number of samples analyzed. An inorganic mercury spike may be included to demonstrate that inorganic mercury species are not extracted along with the methylmercury fraction. Duplicate samples are run with every 20 samples or with every sample set. Certified reference materials samples are run with every sample set. Percent recovery of the certified value is calculated and used as a measure of accuracy.

1.9 Data Reduction, Validation, and Reporting/Interpretation

1.9.1 Data Management

The project's overall data management will move along the steps outlined below. The person, or laboratory, responsible for each step is listed. The Project Office will delegate authority and responsibility for satisfactory completion of the data management steps under his or her supervision. Any corrections required will be returned to earlier steps. The data management steps are as follows:

	DATA MANAGEMENT STEP	**BY**
1.	Daily logbook entries and data collection schedule	Collector
2.	Field measurements and forms	Collector
3.	Sample collection and forms	Collector
4.	Daily QA/QC on-site review of field logbooks, measurements, and sample collection forms	Field Team
5.	Sample processing and shipment	Collector
6.	Monthly QA/QC on-site review of field logbooks, measurements and sample collections	Project Officer
7.	Laboratory analyses	TERL
8.	Laboratory reports of results and QA/QC data	TERL
9.	Laboratory reports review	PACF
10.	Data check and validation	Project Officer
11.	Data compilation and check against Tribal standards	Project Officer
12.	Data collection progress review/report	Project Officer
13.	Data incorporation into final report	Project Officer
14.	Review and approval of final report	Field Supervisor Principal Investigator

1.9.2 Data reduction

Data produced by all field and laboratory activities will be reduced (generally to tabular form), checked for accuracy by the field personnel or laboratory analyst and a reviewer, and reported in computerized and hard copy formats. Data produced by field activities will be recorded in bound notebooks. Raw data resulting from analytical procedures are reduced to reported concentrations by the analyst following guidance and equations in the appropriate USEPA or approved method.

1.9.3 Data quality assessment

The field team performing field measurements has the prime responsibility for entering data and observations into field notebooks or field logsheets. Each page will be initiated by the person recording the information. Another team member, on site, will inspect the entries for accuracy and adherence to standard procedures or documentation for nonstandard procedures. The Project Officer or her designee will periodically review field notebooks for completeness and adherence

to standard procedures. The Project Officer or her designee will review all data prior to entry into a computer database to ensure that standard procedures were followed, all QA/QC checks were performed, anomalies were documented, and data packages are complete.

Three levels of review are performed in the laboratory. At level 1, the laboratory chemist generating the data has the prime responsibility for the correctness and completeness of the data. Each analyst reviews a data package to ensure that: (1) sample preparation information is correct and complete; (2) analysis information is correct and complete; (3) the appropriate standard operating procedures have been followed; (4) analytical results are correct and complete; (5) samples are within established control limits; (6) blanks are within appropriate QC limits; (7) special sample preparation and analytical requirements have been met; (8) documentation is complete (e.g. all anomalies have been reported, holding times have been reported, etc.); and, (9) all calculations have been checked.

At level 2, an independent review of laboratory data is performed by laboratory personnel to ensure that: (1) calibration data are scientifically sound, appropriate to the method, and completely documented; (2) QC samples are within established guidelines; (3) qualitative identification of sample components is correct; (4) documentation is complete and correct; (5) data are ready for incorporation into the final report; and, (6) data package is complete and ready for data archives.

At level 3, the laboratory program manager reviews the report to ensure the data meet the overall objectives of the PACF and USFWS.

All laboratory results will be reviewed by both the laboratory and PACF personnel. This review will focus on the following:

Chain-of-custody forms.
Holding times.
Method calibration limits.
Method blanks.
Laboratory-established detection and quantitation limits.
Analytical batch control records, including spike recoveries and duplicate results.
Corrective actions.
Formulas used for analyte quantitation.
Calculations supporting analyte quantitation.
Completeness of data.

The established detection, quantitation, and control limits will be verified. Method validation will ensure that control charts and statistical calculations are updated to include recent data. Any trends or problems will be noted by the project chemist and any laboratory-established detection or quantitation limits that exceed those in this SAP will be identified. Excessive holding times will be noted. Method calibration and instrument calibration will be verified to assure that no project samples were analyzed when instruments were not properly calibrated.

Environmental sample data will be compared to quality control data to ensure accurate and validated data. This determination will be made using the professional judgment of a multidisciplinary team of hydrologists, biologists, chemists, quality assurance officers, and other personnel having direct experience with the data collection effort. Field duplicate results, field and laboratory blank results and sample matrix effects will be evaluated to identify valid data. Environmental data that are not representative of environmental conditions or were generated through poor field or laboratory practices shall not be used in the evaluation process.

Results from the analysis of blanks will be assessed to determine the sources of contamination and the impact of any contamination on the analytical results for environmental samples.

Contamination proven to be a constant, low-level systematic error that cannot be eliminated will be noted in the interim report, and its impact on the analytical results for environmental samples will be evaluated. The results for environmental samples will not be "corrected" for blank contamination.

1.9.4 Reporting and data interpretation

Field and laboratory data will be provided to Navajo Nation in an interim and a draft final project report, informal technical information reports, data-validation reports, and upon written approval, in a final technical report. Laboratory data and some field data will also be provided in a computerized format compatible to Microsoft software. Quality will be assured during data validation and technical report preparation. The Project Officer or delegated staff will check for the following:

Completeness of field records.
Identification of valid samples.
Correlation of field test data.
Identification of anomalous field test data.
Accuracy and precision of the field test data and measurements.

Field records will be checked to assure that activities required have been accomplished and that field documentation ensures sample integrity and provides sufficient technical information to re-create each field event. Completeness checks will be documented, and environmental data affected by incomplete records will be identified in the documentation.

Identification of valid samples will involve interpretation and evaluation of the field records to detect problems affecting the representativeness of environmental samples. Judgments of sample validity will be documented in a data-validation report and environmental data associated with poor or incorrect field work will be identified in that report.

Field test data will be correlated to assure that data collected by various methods are interpreted consistently. Findings of these correlations will be reported. Anomalous data will be identified and discussed. As requested, an amendment to the Memorandum of Agreement can provide for confidentiality of proprietary, inconclusive, or unsubstantiated information.

Data Treatment and Statistics

Some environmental data will be received in an electronic format. Other data will be initially recorded by hand on printed data forms or notebooks in the field, then transferred to electronic format as spreadsheet data. Printed data sheets and electronic data spreadsheets will be compared to verify accuracy of transfer. Some of the environmental contaminant data will be reported in either dry weight (DW) or wet weight (WW) concentrations and will be so indicated. For statistical purposes and simplicity, all results that are below the analytical laboratory's instrument detection limit, will be replaced with a value one-half the instrument's detection limit prior to further statistical treatment as per USEPA (1998b). Some data will be natural log-transformed to normalize the data distribution prior to parametric statistical tests (Bailey 1981) such as the one-way analysis of variance or students' t-test. Nonparametric statistical tests may also be employed and will be so indicated in text. Several descriptive statistics and analyses (*e.g.*, regression, principal component analyses) will also be conducted on concentrations of selected contaminants in fish tissues. Unless otherwise specified, statistical significance will refer to the level of $p < 0.05$. In addition to spreadsheet software programs, the program STATISTICA (StatSoft Inc. 1994) will be used for statistical summaries and testing of data.

Water Quality Evaluation Methods

Identification of contaminants of concern in surface waters collected for the Navajo Nation Lake Fish and Water Quality Monitoring will be accomplished on a lake basis (*i.e.*, the three collection sites on the lake will be averaged). The process will begin with examination of the existing water quality data for compatibility with approved collection, storage, and analytical methods. The major evaluation method will include a comparison of the concentrations of chemicals in the water column to the various water quality criteria for the beneficial uses of surface waters in the Navajo Nation (NNWQS 1999). As necessary, the water quality standard will be computing using the functional relationships of hardness and other factors as they affect the water quality criteria. When the contamination of field blanks or laboratory blanks is and it was above or approached the water quality criterion, ***then these data will be reported with a data qualifier.***

Fish Tissue Quality Evaluation Methods

Identification of contaminants of concern in whole body fish collected for the Navajo Nation Lake Fish and Water Quality Monitoring will be accomplished on a species and lake basis. The evaluation methods included a comparison of the concentrations of chemicals in fish tissues to a reference site (tentatively Wheatfield Lake) as well as to various concentrations (Tissue Quality Criteria) reported in the literature that affect wildlife or livestock (NRC 1980; Sample *et al.* 1996; USDOI 1998). For whole body fish, mean concentrations reported in the re-integrated fish will be compared to concentrations in whole body fish collected nationwide (Schmitt *et al.* 1999), to threshold concentrations in fish fillets consumed by people (USEPA 1997a), and in fish fillets collected regionally (Fresquez *et al.* 1999; Simpson *et al.*). Emphasis was placed on the bioaccumulation of contaminants that are known to pose serious health risks to wildlife or

people. ***Both water and fish quality data will be used to assist in fish advisory program development.***

After fish dry weight concentrations have been converted to wet weight, all fish which had fillets removed and corresponding partial body samples submitted for analysis will be "integrated" (as the sum of weighted concentrations of the parts of a fish) to yield "whole" fish analytical concentrations. This allows comparisons with other whole body samples as well as with other studies, which reported whole body sample contaminant residues. This also allows the direct comparison between fillet concentration and whole body concentration. An example of the "integrated-fish" calculation method is provided below. If a particular analyte concentration is below the detection limit in the fillet but not in the partial body, then a value of one-half the detection limit concentration will be assigned during the calculation of the integrated-fish concentration. If both the fillet sample and partial-body sample have an analyte concentration that was below the detection limit, then the higher of the two detection limits, preceded by a "less than" symbol (<), will be presented in the data tables as the integrated-fish concentration.

Integrated fish concentration = [(fM/wM) x cF] + [(pM/wM) x cP]

where:

fM = mass of a fillet (g)
wM = whole body mass = mass of fillet + mass of partial body (g)
cF = contaminant concentration in a fillet (mg/kg)
pM = mass of partial body (g)
cP = contaminant concentration in partial body (mg/kg)

example:

Given:
fM = 20 g
pM = 180 g
wM = fM + pM = 200 g
cF = 0.5 mg/kg
cP = 2.8 mg/kg

Then:
integrated fish concentration =

((20g/200g) x 0.5mg/kg) + ((180g/200g) x 2.8mg/kg)

= 2.57 mg/kg

WILDLIFE AND HUMAN HEALTH RISK ASSESSMENT

Trace element concentrations found in trout or catfish may be used to evaluate the potential risk to wildlife or humans consuming fish from the Navajo Nation Lakes as requested and provided with appropriate scenarios of exposure by the Environmental Protection Agency Water Quality Program. Several potential human exposure pathways could be considered (Table 1). One scenario could be of a child, age 1 to 6, that would consume up to 0.085 kg (~3 ounces) of fish per day for up to 156 days out of the year (3 times/week). This scenario is believed to be a reasonable risk assessment of the human consumption of fish from the Navajo Nation Lakes, as children are believed to be sensitive of contaminant-related risks.

This risk assessment, however, will not necessarily provide a complete picture of contaminant-related risk at these fishing lakes. It will be based on a relatively small number of fish samples, and should be viewed as a preliminary screening of potential risk. Furthermore, any risk assessment makes assumptions and can not take into account those site-specific factors that may deviate from the norm, such as daily fishing and consumption of fish, additional ingestion of water and sediment from recreational use, or irregular fishing patterns. This risk assessment will assume "average" conditions and will not take into account such factors as the bioavailability of contaminants or any special method of food preparation.

Table 1. Summary of parameters for estimating daily intake of trace elements in humans

Subpopulation	Fish Ingestion Rate (kg/day)[a]	Exposure Frequency (days/year)[b]	Body Mass (kg)[a]
ages 1 - 6	0.085	14	14.5
ages 1 - 6	0.085	156	14.5
adults	0.114	14	70.0
adults	0.114	156	70.0

a Based on USEPA (2000) suggested "meal sizes" and typical body weights.
b Estimates for recreational fishing = 14 days/yr, and subsistence fishing = 156 days/year (3 days/week). These assumptions are *not* based on actual surveys of fishing patterns at the Navajo Nation Lakes.

Estimates of risks to human consumers of fish will be evaluated according to USEPA (1999) and other published data ***where such data is available for individual contaminants***. Contaminant concentrations used to estimate daily intake values will be obtained from the mean concentration or 85th percentile concentration of each of the elements used in the risk assessment. For human health considerations, only fillets were to be considered consumed from fish. Once the contaminant intake rate is calculated, it will be divided by USEPA oral ingestion related risk Reference Doses (RfDs) to obtain a Hazard Quotient (HQ). RfDs will be obtained from chronic daily intake levels above which adverse health effects are suggested may occur. An RfD is a concentration at which humans are unlikely to experience an appreciable risk of noncarcinogenic deleterious effects over a lifetime. Inherent in the RfDs are uncertainty factors. An uncertainty factor of 10 has been calculated into the RfD values derived from the USEPA No Observed Adverse Effect Level (NOAEL) for individual elements to account for variation between animals studied in the laboratory and the human population.

The calculation of potential human daily intakes of trace elements due to fish ingestion will be calculated according to the following formula:

Equation B-1. Equation used to estimate daily contaminant intakes due to ingestion of fish items.

$$Intake = (C_m \times SFIR \times EF)/(BW \times AT)$$ where:

Intake	contaminant intake rate (mg/kg-day)
C_m	contaminant m concentration in fish (mg/kg)
SFIR	subpopulation (e.g., adults vs. children) fish ingestion rate (kg/day)
EF	exposure frequency (days/year)
BW	body mass (kg)
AT	averaging time (days/year)

Another factor of 10 was used by the USEPA if the value was based on the Lowest Observed Adverse Effect Level (LOAEL). An additional factor of 10 was added to account for sensitive subpopulations, such as children, pregnant women, or smaller than average adults. The RfDs for the elements used in this risk assessment are listed below in Table C-2.

Table C-2. Oral reference doses for elements used in the risk assessment and reference.

Element	Oral RfD (mg/kg-day)	Reference
Arsenic	0.0003	IRIS
Cadmium	0.0005	IRIS
Copper	0.0371	HEAST
Mercury	0.0003	IRIS
Selenium	0.005	IRIS
Zinc	0.3	IRIS

HEAST -- USEPA Health Effects Assessment Summary Tables, 1992
IRIS -- USEPA Integrated Risk Information Service, 2001

Based on these data, a hazard quotient will be calculated for each element ***for which these data exist***. If the HQ obtained is above one, then risk associated with the consumption of fish will be considered to be elevated. To obtain the hazard quotient, one obtains an individual characterization of risk for each element. These individual characterizations can be excellent indicators of potential contaminant-related problems, but do not adequately express the combined risk from all elements in the fillets. Therefore, from these individual element HQs, an aggregate Hazard Index (HI) will be obtained, which shows the combined effect of contaminants, by adding together the individual element hazard quotients. If a hazard index is less than one, chronic adverse effects from ingestion of fish will be considered unlikely to occur. The hazard index assumes that a threshold exists (i.e., HI $\geq$ 1) below which exposure does not cause adverse effects. The hazard index that will be used here assumes elements act additively, and it does not take into account synergistic or antagonistic interactions between elements, or other more complex biological processes, such as organ transport. Hazard indices and hazard quotients for adult and children fishers will be calculated and presented in the data tables. A preliminary risk characterization will be provided in the interim report, and if requested in the final report. The risk characterization should be considered as preliminary, as it was only applied to average or assumed scenarios (ultimately, worst case). Creel surveys, and other methods to quantify actual fish consumption rates, may be necessary to confirm any assumptions of fish consumption rates used in these calculations.

For the bald eagle (and other representative piscivorous species), fish are the primary prey. Therefore, health risks from contaminants in fish from the Navajo Nation fishing lakes will be evaluated by comparing mean, 85th percentile, and maximum metal concentrations in fish tissues to published ***and known*** Toxicity Reference Values (TRVs) for adverse health effects in similar surrogate species (Table 3; USEPA 1998b). Food consumption rates and bird body weights will be derived from the USEPA Wildlife Exposure Handbook. Assuming a "worst-case scenario" in which exposure duration is 365 days/year and 100 percent fish consumption, a contaminant intake rate will be calculated, and expressed as mg/kg/day.

Dividing the contaminant intake rate by the TRV will yield a Hazard Quotient (HQ), where a HQ greater than 1.0 indicates a potential risk to that organism (see Equation 2). The HQ is an individual characterization of risk for a particular element. From these individual element HQs, an aggregate Hazard Index (HI) will be obtained, which will show the combined effect of contaminants, by adding together the individual element hazard quotients. If a HI is less than one, chronic adverse effects from ingestion of fish will be considered unlikely to occur. The HI assumes that a threshold exists (i.e., HI greater than or equal to 1) below which exposure does not cause adverse effects. The HI used here assumes elements act additively, and does not take into account synergistic or antagonistic interactions between elements, or other more complex biological processes, such as organ transport. All hazard indices and hazard quotients for wildlife consumers will be calculated and presented in data tables. A preliminary risk characterization will be provided in the interim report, and if requested in the final report.

Equation 2. Equation used to estimate daily contaminant intakes due to ingestion of fish.

$$Intake = (C_m \times FDIET \times EF)/ (BW \times AT)$$

where:

Intake	contaminant intake rate (mg/kg-day)
C_m	contaminant m concentration in fish (mg/kg)
FDIET	Fraction fish ingestion (0 - 1)
EF	exposure frequency (days/year)
BW	body mass (kg)
AT	averaging time (days/year) - 365

Table 3. Toxicity Reference Values (TRVs) for elements used in risk assessment calculations and reference.

Element	TRV (mg/kg-day)	Reference
Arsenic (total)	5.140	Sample *et al.* 1996
Cadmium	1.450	Sample *et al.* 1996
Chromium (VI)	1.000	Sample *et al.* 1996
Copper	28.000	Chino ERA 1999
Lead	0.450	Sample *et al.* 1996
Mercury	1.130	Sample *et al.* 1996
Selenium	0.500	Sample *et al.* 1996
Vanadium	2.400	Chino ERA 1999
Zinc	14.500	Sample *et al.* 1996

2.0 FIELD SAMPLING PLAN (FSP)

The scope of the Navajo Nation Lake Fish and Water Quality project consists of fish and water collection, preparation, analysis, and data evaluation. Addition water quality measurements of dissolved oxygen, temperature, specific conductivity, and pH will be taken to characterize the aquatic environment. The following sections provide an overview of the field sampling plan, requirements and procedures for field methodologies to be employed, field QA/QC program, and reporting of field measurements and analytical results.

2.1 Field Operations

2.1.1 Surface-water sampling

Surface-water will be sampled at 15 locations along 2 perpendicular cross-sections in each lake accessed by a boat and composited into 3 water samples for analyses. Sampling locations will be distributed equidistant along the perpendicular cross-sections, with 10 locations along the longest cross-section composited into 2 water samples, and 5 locations along the shortest cross-section

composited into 1 sample. Surface water samples will be collected from the top of the water column. A Teflon, DH-95 surface-water sampler, bottle, cap, and nozzle will be used to collect the water sample. Surface-water samples to be analyzed for trace elements will be transferred from the plastic bottle and composited ***(lower precision required)*** in a plastic churn splitter. The composited water will then be transferred from the sample churn using a peristaltic pump, C-flex tubing, and a 0.45 micron in-line capsule filter to the sample bottle. However, samples to be analyzed for methyl mercury concentrations will be grab ***(higher precision required)*** samples transferred directly to sample bottles. In total, 3 grab samples for methyl mercury analysis and 3 filtered samples composited from 5 locations will be collected.

Water sampling of the lakes will occur by boat. A line of the shortest traverse from entry to the opposite shore will be travelled by boat. At approximately equi-distant points along that line the boat will cease movement 5 times and 2 liters of water will be collected from the epilimnion for compositing. At one location along the traverse, grab samples will be collected, using ultra-clean techniques, for mercury and methyl mercury analyses. Next we will travel along a line of longest traverse that is perpendicular to the first traverse line. At approximately 5 equi-distant points along the first half of that line the boat will cease movement and 2 liter samples of water for compositing will be collected from the epilimnion. This practice will be repeated on the second half of this perpendicular traverse. This will result in 3 composited water samples for a metal scan, 3 grab samples for a mercury scan, and 3 grab samples for a methyl mercury scan for each lake. While lake water quality is known to have spatial variability vertically, horizontally, and seasonally, the sampling design cannot accomodate these factors within the budget.

Field quality control samples will be obtained. Field duplicates will be obtained at a frequency of 10% of all samples. One equipment blank will be obtained during sampling. The laboratory will provide and analyze all required matrix spike duplicates**.**

The following standard operating procedures (SOPs) are for collection of surface-water samples to be analyzed for inorganic constituents:

SOP 1—Preparation of sampling equipment for composite sample collection:

1. Put on gloves;
2. Remove sampler, bottle, and nozzle from plastic bags and assemble;
3. Dip sampler in lake, fill with native lake water, and empty through nozzle;
4. Collect aliquot of native lake water with the sampler and pour into churn splitter through the funnel; repeat until the churn splitter contains 2 to 4 liters of native lake water;
5. Remove churn splitter and inner plastic bag from carrier and outer plastic bag (outer bag remains in carrier);
6. Thoroughly circulate water in churn splitter with churn paddle;
7. Force spigot through the remaining plastic bag (inner bag) and drain water through spigot; and
8. Pull bag over spigot, rotate churn splitter so that spigot is away from hole in bag, and place churn splitter and inner bag into outer bag and carrier.

SOP 2—Sample collection using the DH95 sampler

1. Establish 2 cross sections perpendicular to lake width and length;
2. Establish equal-width measuring points along the cross section so there are 15 measuring points;
3. Prepare sampler and churn splitter as described in SOP 1;
4. At the first sampling point, with nozzle of the sampler pointing directly away from boat, slowly lower the sampler from the surface of the lake to the length of the sampling pole and raise sampler back to the surface. Lowering and raising speed must be uniform;
5. Determine how full the sample bottle is after the first cross section. If the bottle is more than about $^{1/3}$ full, deposit the sample into the churn splitter. If the sample bottle becomes more than about ¾ full at any time during sampling, the sample must be discarded and recollected at the affected sampling points; and
6. Repeat steps 4 and 5 at each sampling point.

SOP 3—Sample collection using the DH95 Sample bottle without churn

1. Prepare sample bottle and sampler as described in SOP 1;
2. Sample reagent grade water and collect field blank;
3. Then dip the sample bottle in lake and collect sample for methyl mercury analysis.

SOP 4—Transfer filtered sample from churn splitter to laboratory sample bottles

1. Rinse outside of pump inlet tube with de-ionized water and gently shake to remove the majority of the rinsate;
2. Install peristaltic pump inlet tube into the churn splitter pail through capable funnel in lid to a depth below the surface of the sample;
3. Turn on peristaltic pump and pump approximately one liter of sample without collecting;
4. Install disposable filter capsule on end of outlet tube and pump approximately one liter of sample without collecting;
5. Pump sample into prepared laboratory sample bottle;
6. Rinse bottle cap with filtered sample and install on bottle;
7. Repeat 5 and 6 until all required bottles are filled.

Containers, whether empty or filled, will be sealed and stored in a clean environment to prevent contamination. For inorganic samples, the containers will be rinsed with filtered sample water before collecting the samples and adding any preservatives. All sample bottles and preservatives will be sent to the USFWS by TERL no earlier than 2 weeks before sampling; this will insure the sample bottles and preservatives are fresh and have not passed their shelf life.

2.1.2 Fish sampling

Trout and catfish were the fish species selected for sampling as they are the primary species permitted to be fished on the selected lakes by the Navajo Nation Fish and Wildlife Department. Additionally, these fish species have been observed being taken as food items by the bald eagle by the Navajo Nation Natural Heritage Program biologists. Fish samples will be collected at the lakes identified and will be used to measure contaminant concentrations in fish tissue of mercury

and other trace elements. Fish sampling using an electrofishing boat will be attempted at each of the 15 water-sampling locations along the perpendicular cross-sections in each lake. If insufficient catfish (or bass) or trout are available at these locations, then additional locations, as directed by the biologists, will be sampled until 20 fish that are similarly sized (i.e., within 100 millimeters) are obtained. Fishing operation data (e.g., locations, gear, total catch, and shocking seconds of effort), biological data, and measurements on individual fish will be entered on the field notes. A USFWS biologist will be on board during all of the fishing operations to ensure proper handling of the samples. Fish will be collected by net and placed in a live well until sample preparation.

Sample preparation will include anesthetizing the fish, weighing and measuring, removal and compositing of the fillet portion as well as compositing that portion which remains ("the remaining portion"). An examination tray lined with aluminum foil will be used for the dissection for each fish. The maximum total length (mouth closed and caudal fin dorso-ventrally compressed) to nearest mm will be measured using a measuring board. The total weight (to the nearest 0.1 kg using the spring balance or other mass balance) of fish, fillet, and remaining portion will be measured and recorded. To reduce metal contamination, a ceramic knife will be used to remove the fillet. Five similarly-sized fish (± 100 mm) will be composited into 4 samples for analysis. Each trout or catfish will be uniquely identified by an individual identification number, while the composite sample will also be identified by a unique sample number. In total, 4 composite fillet samples for both methyl mercury and trace element analyses as well as 4 composite remaining portion samples for trace element analysis will be collected.

Immediately after they are processed, packaged, and labeled, all samples of trout and catfish will be placed on dry ice in a chest freezer and shipped to the analytical laboratory. All samples will be transported in an USFWS vehicle. Custody forms will be used for transfer of samples between authorized individuals, showing the dates(s) when delivered and received by the Laboratory.

We used the USEPA (2000) guidelines for determining sample sizes of fish from each lake considering variability and budget. While we will attempt to collect additional samples of fish, the minimum number of fish we will attempt to collect was determined using Table 6-1 in USEPA (2000). Our study design's use of 5 composite samples of 5 fish each from 4 lakes has the power of between 60 to 90 percent to determine a statistically significant difference between the screening value of 0.3 ug/g, and the geometric mean concentration of each lakes fish community, depending on the variability of mercury within each fish. To increase the power of the study design, we will attempt to collect additional fish for additional sample composites but will likely encounter logistic difficulties in obtaining and processing more the 20 fish per day along with other sample collection, processing, and shipment.

2.1.3 Site access

Field work will be performed on the Navajo Nation. Access to sampling sites is limited to project personnel escorted by a member of the Navajo Nation at all times.

2.2 Field Measurements

Field measurement of water temperature, air temperature, barometric pressure, specific conductance, pH, dissolved oxygen, turbidity, and secchi disk transparency may also be measured at each site wherever surface-water samples are collected. All field measurements and applicable information will be recorded on field logsheets as follows: surface-water measurements will be recorded on the USFWS – Lake Water and Fish Quality Field Notes (Appendix C). Field measurements will be made after collection and processing of the surface-water and fish samples. Additionally, a simple measurement of light penetration will be made with a secchi disk, which is lowered into the water to record the depth at which it appears to disappear to the observer.

2.3 Equipment decontamination

Equipment, which includes pump tubing, samplers, sampler bottles, caps, nozzles, churn splitters, funnels, bowls, trays, measuring boards, etc., will be decontaminated in the USFWS water-quality laboratory prior to a field activity. Decontamination of sampling equipment may also occur in the field to prevent cross contamination between sampling sites.

The following procedure applies to all surface-water collection and fish preparation equipment:

Required supplies:

- Deionized water (DIW)
- Trace-element-free hydrochloric acid (HCl)
- Liquid detergent free of phosphates
- Disposable, non-powdered vinyl gloves
- Four nonmetallic, clear or uncolored polypropylene or high-density polyethylene basins
- Various nonmetallic, uncolored brushes
- Sealable plastic bags of various sizes
- Wash bottles with clear or uncolored caps

Procedure for cleaning equipment prior to entering the field:

1. Clean all four basins using the same procedure that is used for cleaning equipment described below;
2. Fill basins as follows:
   Basin 1: Detergent solution dilute to 0.2 percent with tap water;
   Basin 2: DIW;
   Basin 3: HCl, diluted to 5 percent with DIW;
   Basin 4 DIW;
3. Disassemble all equipment, immerse all parts in detergent solution (Basin 1) for 30 minutes;
4. Put on vinyl gloves;
5. Scrub each piece of equipment with detergent solution; then transfer equipment to DIW (Basin 2);

6. Change gloves;
7. Rinse each piece of equipment with DIW until soap bubbles are no longer present; then place in HCl solution (Basin 3); soak for 30 minutes;
8. Change gloves;
9. Transfer each piece of equipment with DIW and place on clean plastic sheet;
10. Thoroughly rinse each piece of equipment with DIW and place on clean plastic sheet;
11. Conduct Step 10 two more times;
12. Place all equipment in appropriately-sized outer and inner plastic bags and seal.

To prevent cross-contamination between sites, the following procedures are conducted for all equipment that will be reused during a sampling event without undergoing procedures described above:

Procedure for field cleaning of pump tubing and sample processing chamber (pump tubing is to cleaned in the sample processing chamber):

1. Put on gloves;
2. Using pump, pass 1 liter HCl solution through pump tubing;
3. Using pump, pass 2 liters DIW through pump tubing;
4. Double bag pump tubing;
5. Remove and discard preservation chamber cover;
6. Swab surface on which the processing chamber sits with DIW.

Procedure for field cleaning of sampler and churn splitter:

1. Put on gloves;
2. Disassemble sampler and churn splitter;
3. Thoroughly rinse all parts with DIW;
4. Thoroughly rinse all parts with HCl solution;
5. Thoroughly rinse all parts with DIW;
6. Conduct Step 5 two more times;
7. Reassemble sampler and place in plastic bag; reassemble churn splitter and place in plastic bag;
8. Place single-bagged sampler and churn splitter in second plastic bag and place double-bagged equipment into churn-splitter carrier.

2.4 Environmental Sampling

Environmental-sample and associated blank-sample (QC) collection, preservation, custody, and handling will be conducted according to standard USFWS protocols. The quality of these activities will be monitored by reviewing the results of analysis of QC samples. Detailed descriptions of procedures to be used for assessing water-quality conditions by collecting, preserving, maintaining chain-of-custody procedures, and handling of environmental samples from surface water and fish will be provided in SOPs to follow first review.

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UNITED STATES FISH AND WILDLIFE - LAKE FISH AND WATER QUALITY FIELD NOTES

Lake Name______________________________: Date___________: Time Start________

DATA RECORDER(S) ______________________________: Time End________

Team Members______________________________

SAMPLES COLLECTED

WATER CHEMISTRY

- Unfiltered MeHg equip blank ☐
- Unfiltered for methyl mercury ☐
- Filtered for metal scan ☐
- Filtered equipment blank ☐

WATER QUALITY

- Unfiltered for turbidity ☐
- Unfiltered for nutrients ☐
- Filtered for hardness ☐
- Filtered for nutrients ☐

FISH TISSUES

- Fish fillets for methyl mercury ☐
- Fish fillets for metal scan ☐
- Fish remainders for metal scan ☐

Other Observations:
(Codes: 0-none 1-mild 2-moderate 3-serious 4-extreme)

(option: LEAVE BLANK IF NONE)

Floating debris : _____________
Floating garbage : _____________
Floating algae mats : _____________
Fish kill : _____________
Detergent suds : _____________
Odors : _____________
Oil-grease : _____________

Checked by :______________________

Date: ___________________________

Lake Edge Habitat Conditions and Weather

Weather (circle 4): Clear PartlyCloudy Cloudy
Light Medium Heavy Rain
Calm Light Breeze Gusty Windy
Cold Warm Hot Other

EDGE HABITAT CONDITIONS AT EACH CARDINAL (N,S,E,W) DIRECTION:

_______**Edge Site (Latitude _____________ Longitude ______________)**

Bank Stability: **stable/vegetated some sloughing sparse veg/instable bare/sloughed**
Bottom Substrate: **bedrock cobble gravel sand silt organic other______**
Aquatic Vegetation: **patchy lined edge cattails/rushes grasses periphyton**

Comments:____

____

_______**Edge Site (Latitude _____________ Longitude ______________)**

Bank Stability: **stable/vegetated some sloughing sparse veg/instable bare/sloughed**
Bottom Substrate: **bedrock cobble gravel sand silt organic other______**
Aquatic Vegetation: **patchy lined edge cattails/rushes grasses periphyton**

Comments:____

____

_______**Edge Site (Latitude _____________ Longitude ______________)**

Bank Stability: **stable/vegetated some sloughing sparse veg/instable bare/sloughed**
Bottom Substrate: **bedrock cobble gravel sand silt organic other______**
Aquatic Vegetation: **patchy lined edge cattails/rushes grasses periphyton**

Comments:____

____

_______**Edge Site (Latitude _____________ Longitude ______________)**

Bank Stability: **stable/vegetated some sloughing sparse veg/instable bare/sloughed**
Bottom Substrate: **bedrock cobble gravel sand silt organic other______**
Aquatic Vegetation: **patchy lined edge cattails/rushes grasses periphyton**

Comments:____

____

US FISH AND WILDLIFE SERVICE - WATER QUALITY DEVICE CALIBRATION NOTES

Lake Name_____: Date_____

RECORDER(S)_____

GPS Manufacturer: Model: Serial No. Settings: _____
:

Using multiprobe? ☐ Yes ☐ No (if so, fill information below only once)

Manufacturer: Model: Serial No. :

pH Manufacturer: Model: Serial No. :

pH Buffer	Buffer Temp C	Initial Reading	Adj. Reading	Remarks
__.__ __				
__.__ __				
__.__ __				
__.__ __				

SPECIFIC CONDUCTANCE Manufacturer: Model: Serial No. :

Standard value	Std Temp C	Initial Reading	Adj. Reading	Remarks

DISSOLVED OXYGEN Manufacturer: Model: Serial No. :

Calibration:
- ☐ Air Calibration using Site Water
- ☐ Air Calibration using De-ionized Water
- ☐ Air Calibration using sponge

D.O. Zero Check (using zero D.O. solution) ☐ Yes ☐ No

- ☐ Calibration by Winkler Titration

Thermister Check ☐ Yes ☐ No

Absolute Barometric Pressure _____mm Hg; Salinity Correction Factor_____ H_2O Temp._____ °C
Chart D.O. /Sat._____mg/L stirrer used? ☐ Yes ☐ No if yes, ☐ magnetic stirrer ☐ manually stirred
Meter D.O. /Sat._____mg/L; Adjusted to _____ (if correction factor applicable)

BALANCE

Spring scale: Manufacturer: Model: Serial No.: .
Calibration Mass _____grams Mass Before _____grams Mass After_____grams
Electronic Scale: Manufacturer: Model: Serial No.: .
Calibration Mass _____grams Mass Before _____grams Mass After_____grams

TURBIDIMETER Manufacturer: Model: Serial No.: .
Primary Calibration Date?_____
Secondary Calibration Standard (0-10) Reading_____
Secondary Calibration Standard (10-100) Reading_____
Secondary Calibration Standard (100-400) Reading_____

Calibration Notes and Remarks:_____
_____
_____
_____
_____

US FISH AND WILDLIFE SERVICE – LAKE LIMNOLOGY AND WATER QUALITY MEASUREMENT NOTES

Lake Name_____ : Date_____

Collection Team_____RECORDER(S)_____

Station 1 (mark on map)		Latitude		Longitude
Time:		Secchi Depth:		Comments:
Depth (units?_____)	Temp	pH	DO (mg/L) and (%)	Spec Cond

Station 2 (mark on map)		Latitude		Longitude
Time:		Secchi Depth:		Comments:
Depth (units?_____)	Temp	pH	DO (mg/L) and (%)	Spec Cond

Station 3 (mark on map)		Latitude		Longitude
Time:		Secchi Depth:		Comments:
Depth (units?_____)	Temp	pH	DO (mg/L) and (%)	Spec Cond

Station 4 (mark on map)		Latitude		Longitude
Time:		Secchi Depth:		Comments:
Depth (units?_____)	Temp	pH	DO (mg/L) and (%)	Spec Cond

Station 5 (mark on map)		Latitude		Longitude
Time:		Secchi Depth:		Comments:
Depth (units?_____)	Temp	pH	DO (mg/L) and (%)	Spec Cond

Station 6 (mark on map)		Latitude		Longitude
Time:		Secchi Depth:		Comments:
Depth (units?_____)	Temp	pH	DO (mg/L) and (%)	Spec Cond

Station 7 (mark on map)		Latitude		Longitude
Time:		Secchi Depth:		Comments:
Depth (units?_____)	temp	pH	DO (mg/L) and (%)	Spec Cond

Station 8 (mark on map)		Latitude		Longitude
Time:		Secchi Depth:		Comments:
Depth (units?_____)	temp	pH	DO (mg/L) and (%)	Spec Cond

Station 9 (mark on map)		Latitude		Longitude
Time:		Secchi Depth:		Comments:
Depth (units?_____)	temp	pH	DO (mg/L) and (%)	Spec Cond

Station 10 (mark on map)		Latitude		Longitude
Time:		Secchi Depth:		Comments:
Depth (units?_____)	temp	pH	DO (mg/L) and (%)	Spec Cond

Station 11 (mark on map)		Latitude		Longitude
Time:		Secchi Depth:		Comments:
Depth (units?_____)	temp	pH	DO (mg/L) and (%)	Spec Cond

Station 12 (mark on map)		Latitude		Longitude
Time:		Secchi Depth:		Comments:
Depth (units?_____)	temp	pH	DO (mg/L) and (%)	Spec Cond

Station 13 (mark on map)		Latitude		Longitude
Time:		Secchi Depth:		Comments:
Depth (units?_____)	temp	pH	DO (mg/L) and (%)	Spec Cond

Station 14 (mark on map)		Latitude		Longitude
Time:		Secchi Depth:		Comments:
Depth (units?_____)	temp	pH	DO (mg/L) and (%)	Spec Cond

Station 15 (mark on map)		Latitude		Longitude
Time:		Secchi Depth:		Comments:
Depth (units?_____)	temp	pH	DO (mg/L) and (%)	Spec Cond

Station 16 (mark on map)		Latitude		Longitude
Time:		Secchi Depth:		Comments:
Depth (units?_____)	temp	pH	DO (mg/L) and (%)	Spec Cond

US FISH AND WILDLIFE SERVICE - FISH QUALITY MEASUREMENT NOTES

Lake Name_____ : Date_____

Electrofishing Settings_____ : Shocking Seconds_____Time Begin_____&End_____

Collection Team_____RECORDER(S)_____

Species Name:					
Fish #	Length (mm)	Weight (g)	Fillet Wt	Offal Wt	Health Notes
001					
002					
003					
004					
005					
	Avg:	Avg:	Sum:	Sum:	
			Samp ID	Samp ID	
# Redo					

Species Name:					
Fish #	Length (mm)	Weight (g)	Fillet Wt	Offal Wt	Health Notes
006					
007					
008					
009					
010					
	Avg:	Avg:	Sum:	Sum:	
			Samp ID	Samp ID	

Species Name:					
Fish #	Length (mm)	Weight (g)	Fillet Wt	Offal Wt	Health Notes
011					
012					
013					
014					
015					
	Avg:	Avg:	Sum:	Sum:	
			Samp ID	Samp ID	

Species Name:					
Fish #	Length (mm)	Weight (g)	Fillet Wt	Offal Wt	Health Notes
016					
017					
018					
019					
020					
	Avg:	Avg:	Sum:	Sum:	
			Samp ID	Samp ID	
# Redo					

Use this page to draw map with the Lake Limnology and Water Quality Measurement Notes
– *Please Note NORTH* –

US FISH AND WILDLIFE SERVICE – LAKE MAP

Lake Name_____ : Date_____

Appendix I. Environmental Contaminants Data Management System
Analytical Results Report 7/24/2004

Analytical Results Report TOC

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1. ECDMSAnalytical Results Report 7/24/2004

Catalog Number	Purchase Order Number	Lab ID	Catalog Submitter	ECDMS User ID
2020123	94420-04-Y372	TERL	Lusk, Joel - Albuquerque, NM	r2alfo

Catalog Title	Navajo Nation Lake Fish & Water Quality
Lab Name:	Trace Element Research Laboratory
Regional Study ID:	NavFish2004
Regional Study Title:	Navajo Nation Lake Fish and Water Quality Monitoring Project

Notes, Symbols and Abbreviations Used
Based on the report options selected the report should be **printed in landscape mode**
Notes, Symbols and Abbreviations Used The following may appear before a reported result (e.g. < 1234). < - Less than symbol indicates that the actual result is less than the reported detection limit. > - Greater than symbol indicates that the actual result is greater than the reported result.
All results are reported as 3 significant digits.
All results are reported as parts per million (ppm), or percent, unless otherwise noted.

1. Integrity Report

Lab Receipt Date	04/06/2004	**Lab Approval Date**	04/06/2004

Catalog Problems
No problems reported
Problem Resolution

2. Bulk Data

Sample Number	Sample Matrix	Sample Weight (grams)	Percent Moisture
T3042029	Fillets without Skin	310	77.3
T3042030	Fillets without Skin	206	77.6
T3042031	Fillets without Skin	276	77.9
T3042032	Fillets without Skin	158	78.1
T3042033	Fillets without Skin	118	79.5
T3042034	Fillets without Skin	134	78.4
T3042035	Fillets without Skin	59.75	77.3
T3042036	Fillets without Skin	57.045	77.2
T3042037	Fillets without Skin	214	82.5
T3042038	Fillets without Skin	220	81.6
T3042039	Fillets without Skin	314	81.3
T3042040	Fillets without Skin	306	81.2
T3042041	Fillets without Skin	308	81.4
T3042042	Fillets without Skin	202	82.9
T3042043	Fillets without Skin	422	80.0
T3042044	Fillets without Skin	238	83.3
T3042045	Offal	2652	73.5
T3042046	Offal	1634	72.1
T3042047	Offal	2793	74.7
T3042048	Offal	1166	76.0
T3042049	Offal	726	77.7
T3042050	Offal	764	75.6
T3042051	Offal	382	73.9
T3042052	Offal	320	74.2
T3042053	Offal	4100	80.0
T3042054	Offal	4280	72.9
T3042055	Offal	4860	77.5
T3042056	Offal	3996	76.0
T3042057	Offal	2904	70.7
T3042058	Offal	1632	76.8
T3042059	Offal	3044	71.6

Sample Number	Sample Matrix	Sample Weight (grams)	Percent Moisture
T3042060	Offal	2114	75.1
T3042001	Water	500	
T3042002	Water	500	
T3042003	Water	500	
T3042004	Water	500	
T3042005	Water	500	
T3042006	Water	500	
T3042007	Water	500	
T3042008	Water	500	
T3042009	Water	500	
T3042010	Water	500	
T3042011	Water	500	
T3042012	Water	500	
T3042013	Water	500	
T3042014	Water	500	
T3042015	Water	500	
T3042016	Water	500	
T3042017	Water	500	
T3042018	Water	500	
T3042019	Water	500	
T3042020	Water	500	
T3042021	Water	500	
T3042022	Water	500	
T3042023	Water	500	
T3042024	Water	500	
T3042025	Water	500	
T3042026	Water	500	
T3042027	Water	500	
T3042028	Water	500	

4. Contaminant Concentrations

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
Silver						
	T3042017	Water			< 0.0100	0.0100
	T3042018	Water			< 0.0100	0.0100
	T3042019	Water			< 0.0100	0.0100
	T3042020	Water			< 0.0100	0.0100
	T3042021	Water			< 0.0100	0.0100
	T3042022	Water			< 0.0100	0.0100
	T3042023	Water			< 0.0100	0.0100
	T3042024	Water			< 0.0100	0.0100
	T3042025	Water			< 0.0100	0.0100
	T3042026	Water			< 0.0100	0.0100
	T3042027	Water			< 0.0100	0.0100
	T3042028	Water			< 0.0100	0.0100
Aluminum						
	T3042029	Fillets without Skin	< 4.71	4.71	< 1.07	1.07
	T3042030	Fillets without Skin	< 4.97	4.97	< 1.11	1.11
	T3042031	Fillets without Skin	< 4.56	4.56	< 1.01	1.01
	T3042032	Fillets without Skin	56.7	4.89	12.4	1.07
	T3042033	Fillets without Skin	< 4.85	4.85	< 0.994	0.994
	T3042034	Fillets without Skin	< 4.68	4.68	< 1.01	1.01
	T3042035	Fillets without Skin	10.5	4.80	2.38	1.09
	T3042036	Fillets without	< 4.80	4.80	< 1.09	1.09

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
		Skin				
	T3042037	Fillets without Skin	< 4.68	4.68	< 0.819	0.819
	T3042038	Fillets without Skin	5.68	4.74	1.05	0.872
	T3042039	Fillets without Skin	21.7	4.83	4.06	0.903
	T3042040	Fillets without Skin	12.9	4.77	2.43	0.897
	T3042041	Fillets without Skin	7.90	4.84	1.47	0.900
	T3042042	Fillets without Skin	5.62	4.67	0.961	0.799
	T3042043	Fillets without Skin	< 4.83	4.83	< 0.966	0.966
	T3042044	Fillets without Skin	19.7	4.71	3.29	0.787
	T3042045	Offal	26.8	4.62	7.10	1.22
	T3042046	Offal	30.3	4.56	8.45	1.27
	T3042047	Offal	33.4	4.67	8.45	1.18
	T3042048	Offal	22.4	4.72	5.38	1.13
	T3042049	Offal	22.5	4.62	5.02	1.03
	T3042050	Offal	18.5	4.61	4.51	1.12
	T3042051	Offal	24.0	3.63	6.26	0.947
	T3042052	Offal	12.5	4.65	3.22	1.20
	T3042053	Offal	153	4.53	30.6	0.906
	T3042054	Offal	510.	3.27	138	0.886
	T3042055	Offal	65.1	4.09	14.6	0.920
	T3042056	Offal	70.1	4.57	16.8	1.10
	T3042057	Offal	17.4	3.10	5.10	0.908
	T3042058	Offal	49.7	4.13	11.5	0.958

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042059	Offal	31.0	3.36	8.80	0.954
	T3042060	Offal	49.7	3.77	12.4	0.939
	T3042017	Water			0.143	0.0500
	T3042018	Water			0.153	0.0500
	T3042019	Water			< 0.0500	0.0500
	T3042020	Water			0.127	0.0500
	T3042021	Water			0.236	0.0500
	T3042022	Water			< 0.0500	0.0500
	T3042023	Water			0.0800	0.0500
	T3042024	Water			0.166	0.0500
	T3042025	Water			< 0.0500	0.0500
	T3042026	Water			< 0.0500	0.0500
	T3042027	Water			< 0.0500	0.0500
	T3042028	Water			< 0.0500	0.0500
Arsenic						
	T3042029	Fillets without Skin	0.363	0.188	0.0824	0.0427
	T3042030	Fillets without Skin	0.483	0.199	0.108	0.0446
	T3042031	Fillets without Skin	0.301	0.182	0.0665	0.0402
	T3042032	Fillets without Skin	0.667	0.196	0.146	0.0429
	T3042033	Fillets without Skin	1.01	0.194	0.207	0.0398
	T3042034	Fillets without Skin	0.830	0.187	0.179	0.0404
	T3042035	Fillets without Skin	1.03	0.192	0.234	0.0436
	T3042036	Fillets without Skin	0.511	0.192	0.117	0.0438

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042037	Fillets without Skin	0.295	0.187	0.0516	0.0327
	T3042038	Fillets without Skin	0.335	0.189	0.0616	0.0348
	T3042039	Fillets without Skin	0.279	0.193	0.0522	0.0361
	T3042040	Fillets without Skin	0.255	0.191	0.0479	0.0359
	T3042041	Fillets without Skin	< 0.194	0.194	< 0.0361	0.0361
	T3042042	Fillets without Skin	0.216	0.187	0.0369	0.0320
	T3042043	Fillets without Skin	0.408	0.193	0.0816	0.0386
	T3042044	Fillets without Skin	0.246	0.188	0.0411	0.0314
	T3042045	Offal	< 1.85	1.85	< 0.490	0.490
	T3042046	Offal	< 1.82	1.82	< 0.508	0.508
	T3042047	Offal	< 1.87	1.87	< 0.473	0.473
	T3042048	Offal	< 1.89	1.89	< 0.454	0.454
	T3042049	Offal	< 1.85	1.85	< 0.413	0.413
	T3042050	Offal	< 1.85	1.85	< 0.451	0.451
	T3042051	Offal	1.49	1.45	0.389	0.378
	T3042052	Offal	< 1.86	1.86	< 0.480	0.480
	T3042053	Offal	< 1.81	1.81	< 0.362	0.362
	T3042054	Offal	1.33	1.31	0.360	0.355
	T3042055	Offal	< 1.63	1.63	< 0.367	0.367
	T3042056	Offal	< 1.83	1.83	< 0.439	0.439
	T3042057	Offal	< 1.24	1.24	< 0.363	0.363
	T3042058	Offal	< 1.65	1.65	< 0.383	0.383
	T3042059	Offal	< 1.34	1.34	< 0.381	0.381

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042060	Offal	< 1.51	1.51	< 0.376	0.376
	T3042017	Water			0.00210	0.000200
	T3042018	Water			0.00310	0.000200
	T3042019	Water			< 0.000200	0.000200
	T3042020	Water			0.00560	0.000200
	T3042021	Water			0.00560	0.000200
	T3042022	Water			< 0.000200	0.000200
	T3042023	Water			0.00820	0.000200
	T3042024	Water			0.00830	0.000200
	T3042025	Water			< 0.000200	0.000200
	T3042026	Water			0.00630	0.000200
	T3042027	Water			0.00590	0.000200
	T3042028	Water			< 0.000200	0.000200
Boron						
	T3042029	Fillets without Skin	< 0.942	0.942	< 0.214	0.214
	T3042030	Fillets without Skin	< 0.994	0.994	< 0.223	0.223
	T3042031	Fillets without Skin	< 0.912	0.912	< 0.202	0.202
	T3042032	Fillets without Skin	< 0.978	0.978	< 0.214	0.214
	T3042033	Fillets without Skin	< 0.969	0.969	< 0.199	0.199
	T3042034	Fillets without Skin	< 0.937	0.937	< 0.202	0.202
	T3042035	Fillets without Skin	< 0.959	0.959	< 0.218	0.218
	T3042036	Fillets without Skin	< 0.959	0.959	< 0.219	0.219
	T3042037	Fillets without Skin	< 0.937	0.937	< 0.164	0.164

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042038	Fillets without Skin	< 0.947	0.947	< 0.174	0.174
	T3042039	Fillets without Skin	< 0.965	0.965	< 0.180	0.180
	T3042040	Fillets without Skin	< 0.955	0.955	< 0.180	0.180
	T3042041	Fillets without Skin	< 0.968	0.968	< 0.180	0.180
	T3042042	Fillets without Skin	1.01	0.933	0.173	0.160
	T3042043	Fillets without Skin	< 0.967	0.967	< 0.193	0.193
	T3042044	Fillets without Skin	< 0.942	0.942	< 0.157	0.157
	T3042045	Offal	< 0.924	0.924	< 0.245	0.245
	T3042046	Offal	< 0.912	0.912	< 0.254	0.254
	T3042047	Offal	< 0.935	0.935	< 0.237	0.237
	T3042048	Offal	< 0.945	0.945	< 0.227	0.227
	T3042049	Offal	< 0.924	0.924	< 0.206	0.206
	T3042050	Offal	< 0.923	0.923	< 0.225	0.225
	T3042051	Offal	< 0.726	0.726	< 0.189	0.189
	T3042052	Offal	< 0.929	0.929	< 0.240	0.240
	T3042053	Offal	3.77	0.905	0.754	0.181
	T3042054	Offal	5.76	0.654	1.56	0.177
	T3042055	Offal	1.30	0.817	0.292	0.184
	T3042056	Offal	0.946	0.915	0.227	0.220
	T3042057	Offal	0.971	0.620	0.285	0.182
	T3042058	Offal	1.95	0.826	0.452	0.192
	T3042059	Offal	< 0.672	0.672	< 0.191	0.191
	T3042060	Offal	1.47	0.754	0.366	0.188
	T3042017	Water			0.0100	0.0100

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042018	Water			0.0100	0.0100
	T3042019	Water			< 0.0100	0.0100
	T3042020	Water			0.0800	0.0100
	T3042021	Water			0.0800	0.0100
	T3042022	Water			< 0.0100	0.0100
	T3042023	Water			0.130	0.0100
	T3042024	Water			0.134	0.0100
	T3042025	Water			< 0.0100	0.0100
	T3042026	Water			0.634	0.0100
	T3042027	Water			0.652	0.0100
	T3042028	Water			< 0.0100	0.0100
Barium						
	T3042029	Fillets without Skin	< 0.0940	0.0940	< 0.0213	0.0213
	T3042030	Fillets without Skin	< 0.0990	0.0990	< 0.0222	0.0222
	T3042031	Fillets without Skin	< 0.0910	0.0910	< 0.0201	0.0201
	T3042032	Fillets without Skin	0.176	0.0980	0.0385	0.0215
	T3042033	Fillets without Skin	0.301	0.0970	0.0617	0.0199
	T3042034	Fillets without Skin	0.806	0.0940	0.174	0.0203
	T3042035	Fillets without Skin	0.269	0.0960	0.0611	0.0218
	T3042036	Fillets without Skin	0.115	0.0960	0.0262	0.0219
	T3042037	Fillets without Skin	0.487	0.0940	0.0852	0.0164
	T3042038	Fillets without Skin	0.275	0.0950	0.0506	0.0175

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042039	Fillets without Skin	0.193	0.0970	0.0361	0.0181
	T3042040	Fillets without Skin	0.344	0.0950	0.0647	0.0179
	T3042041	Fillets without Skin	0.135	0.0970	0.0251	0.0180
	T3042042	Fillets without Skin	0.112	0.0930	0.0192	0.0159
	T3042043	Fillets without Skin	< 0.0970	0.0970	< 0.0194	0.0194
	T3042044	Fillets without Skin	0.697	0.0940	0.116	0.0157
	T3042045	Offal	9.24	0.0920	2.45	0.0244
	T3042046	Offal	4.40	0.0910	1.23	0.0254
	T3042047	Offal	14.2	0.0930	3.59	0.0235
	T3042048	Offal	4.07	0.0940	0.977	0.0226
	T3042049	Offal	6.92	0.0920	1.54	0.0205
	T3042050	Offal	10.3	0.0920	2.51	0.0224
	T3042051	Offal	6.19	0.0730	1.62	0.0191
	T3042052	Offal	4.49	0.0930	1.16	0.0240
	T3042053	Offal	129	0.0910	25.8	0.0182
	T3042054	Offal	46.9	0.0650	12.7	0.0176
	T3042055	Offal	52.1	0.0820	11.7	0.0184
	T3042056	Offal	27.1	0.0910	6.50	0.0218
	T3042057	Offal	4.01	0.0620	1.17	0.0182
	T3042058	Offal	6.13	0.0830	1.42	0.0193
	T3042059	Offal	3.24	0.0670	0.920	0.0190
	T3042060	Offal	2.64	0.0750	0.657	0.0187
	T3042017	Water			0.0490	0.00100
	T3042018	Water			0.0500	0.00100
	T3042019	Water			< 0.00100	0.00100

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042020	Water			0.160	0.00100
	T3042021	Water			0.168	0.00100
	T3042022	Water			< 0.00100	0.00100
	T3042023	Water			0.0900	0.00100
	T3042024	Water			0.0930	0.00100
	T3042025	Water			< 0.00100	0.00100
	T3042026	Water			0.132	0.00100
	T3042027	Water			0.136	0.00100
	T3042028	Water			< 0.00100	0.00100
Beryllium						
	T3042029	Fillets without Skin	< 0.0471	0.0471	< 0.0107	0.0107
	T3042030	Fillets without Skin	< 0.0497	0.0497	< 0.0111	0.0111
	T3042031	Fillets without Skin	< 0.0456	0.0456	< 0.0101	0.0101
	T3042032	Fillets without Skin	< 0.0489	0.0489	< 0.0107	0.0107
	T3042033	Fillets without Skin	< 0.0485	0.0485	< 0.00994	0.00994
	T3042034	Fillets without Skin	< 0.0468	0.0468	< 0.0101	0.0101
	T3042035	Fillets without Skin	< 0.0480	0.0480	< 0.0109	0.0109
	T3042036	Fillets without Skin	< 0.0480	0.0480	< 0.0109	0.0109
	T3042037	Fillets without Skin	< 0.0468	0.0468	< 0.00819	0.00819
	T3042038	Fillets without Skin	< 0.0474	0.0474	< 0.00872	0.00872
	T3042039	Fillets without Skin	< 0.0483	0.0483	< 0.00903	0.00903

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042040	Fillets without Skin	< 0.0477	0.0477	< 0.00897	0.00897
	T3042041	Fillets without Skin	< 0.0484	0.0484	< 0.00900	0.00900
	T3042042	Fillets without Skin	< 0.0467	0.0467	< 0.00799	0.00799
	T3042043	Fillets without Skin	< 0.0483	0.0483	< 0.00966	0.00966
	T3042044	Fillets without Skin	< 0.0471	0.0471	< 0.00787	0.00787
	T3042045	Offal	< 0.0462	0.0462	< 0.0122	0.0122
	T3042046	Offal	< 0.0456	0.0456	< 0.0127	0.0127
	T3042047	Offal	< 0.0467	0.0467	< 0.0118	0.0118
	T3042048	Offal	< 0.0472	0.0472	< 0.0113	0.0113
	T3042049	Offal	< 0.0462	0.0462	< 0.0103	0.0103
	T3042050	Offal	< 0.0461	0.0461	< 0.0112	0.0112
	T3042051	Offal	< 0.0363	0.0363	< 0.00947	0.00947
	T3042052	Offal	< 0.0465	0.0465	< 0.0120	0.0120
	T3042053	Offal	< 0.0453	0.0453	< 0.00906	0.00906
	T3042054	Offal	0.0387	0.0327	0.0105	0.00886
	T3042055	Offal	0.0409	0.0409	0.00920	0.00920
	T3042056	Offal	< 0.0457	0.0457	< 0.0110	0.0110
	T3042057	Offal	< 0.0310	0.0310	< 0.00908	0.00908
	T3042058	Offal	< 0.0413	0.0413	< 0.00958	0.00958
	T3042059	Offal	0.0339	0.0336	0.00963	0.00954
	T3042060	Offal	< 0.0377	0.0377	< 0.00939	0.00939
	T3042017	Water			< 0.000500	0.000500
	T3042018	Water			< 0.000500	0.000500
	T3042019	Water			< 0.000500	0.000500
	T3042020	Water			< 0.000500	0.000500

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042021	Water			< 0.000500	0.000500
	T3042022	Water			< 0.000500	0.000500
	T3042023	Water			< 0.000500	0.000500
	T3042024	Water			< 0.000500	0.000500
	T3042025	Water			< 0.000500	0.000500
	T3042026	Water			< 0.000500	0.000500
	T3042027	Water			< 0.000500	0.000500
	T3042028	Water			< 0.000500	0.000500
Calcium						
	T3042029	Fillets without Skin	679	4.71	154	1.07
	T3042030	Fillets without Skin	828	4.97	185	1.11
	T3042031	Fillets without Skin	588	4.56	130.	1.01
	T3042032	Fillets without Skin	1450	4.89	318	1.07
	T3042033	Fillets without Skin	1820	4.85	373	0.994
	T3042034	Fillets without Skin	3090	4.68	667	1.01
	T3042035	Fillets without Skin	1940	4.80	440.	1.09
	T3042036	Fillets without Skin	818	4.80	187	1.09
	T3042037	Fillets without Skin	373	4.68	65.3	0.819
	T3042038	Fillets without Skin	409	4.74	75.3	0.872
	T3042039	Fillets without Skin	358	4.83	66.9	0.903
	T3042040	Fillets without Skin	481	4.77	90.4	0.897

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042041	Fillets without Skin	559	4.84	104	0.900
	T3042042	Fillets without Skin	467	4.67	79.9	0.799
	T3042043	Fillets without Skin	1210	4.83	242	0.966
	T3042044	Fillets without Skin	844	4.71	141	0.787
	T3042045	Offal	22200	4.62	5880	1.22
	T3042046	Offal	22800	4.56	6360	1.27
	T3042047	Offal	28900	4.67	7310	1.18
	T3042048	Offal	24500	4.72	5880	1.13
	T3042049	Offal	31200	4.62	6960	1.03
	T3042050	Offal	25300	4.61	6170	1.12
	T3042051	Offal	28300	3.63	7390	0.947
	T3042052	Offal	22200	4.65	5730	1.20
	T3042053	Offal	51800	4.53	10400	0.906
	T3042054	Offal	47700	3.27	12900	0.886
	T3042055	Offal	89500	4.09	20100	0.920
	T3042056	Offal	65500	4.57	15700	1.10
	T3042057	Offal	55700	3.10	16300	0.908
	T3042058	Offal	65300	4.13	15100	0.958
	T3042059	Offal	83800	3.36	23800	0.954
	T3042060	Offal	34400	3.77	8570	0.939
	T3042017	Water			23.8	0.0200
	T3042018	Water			24.3	0.0200
	T3042019	Water			0.0400	0.0200
	T3042020	Water			29.6	0.0200
	T3042021	Water			30.9	0.0200
	T3042022	Water			0.0800	0.0200

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042023	Water			22.7	0.0200
	T3042024	Water			23.0	0.0200
	T3042025	Water			0.0300	0.0200
	T3042026	Water			98.4	0.0200
	T3042027	Water			101	0.0200
	T3042028	Water			0.0700	0.0200
Cadmium						
	T3042029	Fillets without Skin	< 0.0471	0.0471	< 0.0107	0.0107
	T3042030	Fillets without Skin	< 0.0497	0.0497	< 0.0111	0.0111
	T3042031	Fillets without Skin	< 0.0456	0.0456	< 0.0101	0.0101
	T3042032	Fillets without Skin	< 0.0489	0.0489	< 0.0107	0.0107
	T3042033	Fillets without Skin	< 0.0485	0.0485	< 0.00994	0.00994
	T3042034	Fillets without Skin	< 0.0468	0.0468	< 0.0101	0.0101
	T3042035	Fillets without Skin	< 0.0480	0.0480	< 0.0109	0.0109
	T3042036	Fillets without Skin	< 0.0480	0.0480	< 0.0109	0.0109
	T3042037	Fillets without Skin	< 0.0468	0.0468	< 0.00819	0.00819
	T3042038	Fillets without Skin	< 0.0474	0.0474	< 0.00872	0.00872
	T3042039	Fillets without Skin	< 0.0483	0.0483	< 0.00903	0.00903
	T3042040	Fillets without Skin	< 0.0477	0.0477	< 0.00897	0.00897
	T3042041	Fillets without Skin	< 0.0484	0.0484	< 0.00900	0.00900

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042042	Fillets without Skin	< 0.0467	0.0467	< 0.00799	0.00799
	T3042043	Fillets without Skin	< 0.0483	0.0483	< 0.00966	0.00966
	T3042044	Fillets without Skin	< 0.0471	0.0471	< 0.00787	0.00787
	T3042045	Offal	< 0.0462	0.0462	< 0.0122	0.0122
	T3042046	Offal	< 0.0456	0.0456	< 0.0127	0.0127
	T3042047	Offal	< 0.0467	0.0467	< 0.0118	0.0118
	T3042048	Offal	< 0.0472	0.0472	< 0.0113	0.0113
	T3042049	Offal	< 0.0462	0.0462	< 0.0103	0.0103
	T3042050	Offal	< 0.0461	0.0461	< 0.0112	0.0112
	T3042051	Offal	< 0.0363	0.0363	< 0.00947	0.00947
	T3042052	Offal	< 0.0465	0.0465	< 0.0120	0.0120
	T3042053	Offal	0.597	0.0453	0.119	0.00906
	T3042054	Offal	0.0922	0.0327	0.0250	0.00886
	T3042055	Offal	0.0480	0.0409	0.0108	0.00920
	T3042056	Offal	0.0540	0.0457	0.0130	0.0110
	T3042057	Offal	< 0.0310	0.0310	< 0.00908	0.00908
	T3042058	Offal	< 0.0413	0.0413	< 0.00958	0.00958
	T3042059	Offal	0.0366	0.0336	0.0104	0.00954
	T3042060	Offal	< 0.0377	0.0377	< 0.00939	0.00939
	T3042017	Water			< 0.0000500	0.0000500
	T3042018	Water			< 0.0000500	0.0000500
	T3042019	Water			< 0.0000500	0.0000500
	T3042020	Water			< 0.0000500	0.0000500
	T3042021	Water			< 0.0000500	0.0000500
	T3042022	Water			< 0.0000500	0.0000500
	T3042023	Water			< 0.0000500	0.0000500
	T3042024	Water			< 0.0000500	0.0000500

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042025	Water			< 0.0000500	0.0000500
	T3042026	Water			< 0.0000500	0.0000500
	T3042027	Water			< 0.0000500	0.0000500
	T3042028	Water			< 0.0000500	0.0000500
Cobalt						
	T3042029	Fillets without Skin	< 0.471	0.471	< 0.107	0.107
	T3042030	Fillets without Skin	< 0.497	0.497	< 0.111	0.111
	T3042031	Fillets without Skin	< 0.456	0.456	< 0.101	0.101
	T3042032	Fillets without Skin	< 0.489	0.489	< 0.107	0.107
	T3042033	Fillets without Skin	< 0.485	0.485	< 0.0994	0.0994
	T3042034	Fillets without Skin	< 0.468	0.468	< 0.101	0.101
	T3042035	Fillets without Skin	< 0.480	0.480	< 0.109	0.109
	T3042036	Fillets without Skin	< 0.480	0.480	< 0.109	0.109
	T3042037	Fillets without Skin	< 0.468	0.468	< 0.0819	0.0819
	T3042038	Fillets without Skin	< 0.474	0.474	< 0.0872	0.0872
	T3042039	Fillets without Skin	< 0.483	0.483	< 0.0903	0.0903
	T3042040	Fillets without Skin	< 0.477	0.477	< 0.0897	0.0897
	T3042041	Fillets without Skin	< 0.484	0.484	< 0.0900	0.0900
	T3042042	Fillets without Skin	< 0.467	0.467	< 0.0799	0.0799

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042043	Fillets without Skin	< 0.483	0.483	< 0.0966	0.0966
	T3042044	Fillets without Skin	< 0.471	0.471	< 0.0787	0.0787
	T3042045	Offal	< 0.462	0.462	< 0.122	0.122
	T3042046	Offal	< 0.456	0.456	< 0.127	0.127
	T3042047	Offal	< 0.467	0.467	< 0.118	0.118
	T3042048	Offal	< 0.472	0.472	< 0.113	0.113
	T3042049	Offal	< 0.462	0.462	< 0.103	0.103
	T3042050	Offal	< 0.461	0.461	< 0.112	0.112
	T3042051	Offal	< 0.363	0.363	< 0.0947	0.0947
	T3042052	Offal	< 0.465	0.465	< 0.120	0.120
	T3042053	Offal	0.701	0.453	0.140	0.0906
	T3042054	Offal	< 0.327	0.327	< 0.0886	0.0886
	T3042055	Offal	< 0.409	0.409	< 0.0920	0.0920
	T3042056	Offal	< 0.457	0.457	< 0.110	0.110
	T3042057	Offal	< 0.310	0.310	< 0.0908	0.0908
	T3042058	Offal	< 0.413	0.413	< 0.0958	0.0958
	T3042059	Offal	< 0.336	0.336	< 0.0954	0.0954
	T3042060	Offal	< 0.377	0.377	< 0.0939	0.0939
	T3042017	Water			< 0.00500	0.00500
	T3042018	Water			< 0.00500	0.00500
	T3042019	Water			< 0.00500	0.00500
	T3042020	Water			< 0.00500	0.00500
	T3042021	Water			< 0.00500	0.00500
	T3042022	Water			< 0.00500	0.00500
	T3042023	Water			< 0.00500	0.00500
	T3042024	Water			< 0.00500	0.00500
	T3042025	Water			< 0.00500	0.00500

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042026	Water			< 0.00500	0.00500
	T3042027	Water			< 0.00500	0.00500
	T3042028	Water			< 0.00500	0.00500
Chromium						
	T3042029	Fillets without Skin	< 0.471	0.471	< 0.107	0.107
	T3042030	Fillets without Skin	< 0.497	0.497	< 0.111	0.111
	T3042031	Fillets without Skin	< 0.456	0.456	< 0.101	0.101
	T3042032	Fillets without Skin	< 0.489	0.489	< 0.107	0.107
	T3042033	Fillets without Skin	< 0.485	0.485	< 0.0994	0.0994
	T3042034	Fillets without Skin	< 0.468	0.468	< 0.101	0.101
	T3042035	Fillets without Skin	< 0.480	0.480	< 0.109	0.109
	T3042036	Fillets without Skin	< 0.480	0.480	< 0.109	0.109
	T3042037	Fillets without Skin	< 0.468	0.468	< 0.0819	0.0819
	T3042038	Fillets without Skin	< 0.474	0.474	< 0.0872	0.0872
	T3042039	Fillets without Skin	< 0.483	0.483	< 0.0903	0.0903
	T3042040	Fillets without Skin	< 0.477	0.477	< 0.0897	0.0897
	T3042041	Fillets without Skin	< 0.484	0.484	< 0.0900	0.0900
	T3042042	Fillets without Skin	< 0.467	0.467	< 0.0799	0.0799
	T3042043	Fillets without	< 0.483	0.483	< 0.0966	0.0966

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
		Skin				
	T3042044	Fillets without Skin	< 0.471	0.471	< 0.0787	0.0787
	T3042045	Offal	0.709	0.462	0.188	0.122
	T3042046	Offal	0.819	0.456	0.229	0.127
	T3042047	Offal	< 0.467	0.467	< 0.118	0.118
	T3042048	Offal	0.584	0.472	0.140	0.113
	T3042049	Offal	< 0.462	0.462	< 0.103	0.103
	T3042050	Offal	0.480	0.461	0.117	0.112
	T3042051	Offal	0.857	0.363	0.224	0.0947
	T3042052	Offal	1.16	0.465	0.299	0.120
	T3042053	Offal	2.66	0.453	0.532	0.0906
	T3042054	Offal	2.18	0.327	0.591	0.0886
	T3042055	Offal	2.25	0.409	0.506	0.0920
	T3042056	Offal	2.31	0.457	0.554	0.110
	T3042057	Offal	2.68	0.310	0.785	0.0908
	T3042058	Offal	1.77	0.413	0.411	0.0958
	T3042059	Offal	4.70	0.336	1.33	0.0954
	T3042060	Offal	1.54	0.377	0.383	0.0939
	T3042017	Water			< 0.00500	0.00500
	T3042018	Water			< 0.00500	0.00500
	T3042019	Water			< 0.00500	0.00500
	T3042020	Water			< 0.00500	0.00500
	T3042021	Water			< 0.00500	0.00500
	T3042022	Water			< 0.00500	0.00500
	T3042023	Water			< 0.00500	0.00500
	T3042024	Water			< 0.00500	0.00500
	T3042025	Water			< 0.00500	0.00500
	T3042026	Water			< 0.00500	0.00500

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042027	Water			< 0.00500	0.00500
	T3042028	Water			< 0.00500	0.00500
Copper						
	T3042029	Fillets without Skin	1.50	0.471	0.340	0.107
	T3042030	Fillets without Skin	1.22	0.497	0.273	0.111
	T3042031	Fillets without Skin	1.56	0.456	0.345	0.101
	T3042032	Fillets without Skin	1.57	0.489	0.344	0.107
	T3042033	Fillets without Skin	1.52	0.485	0.312	0.0994
	T3042034	Fillets without Skin	1.72	0.468	0.372	0.101
	T3042035	Fillets without Skin	1.82	0.480	0.413	0.109
	T3042036	Fillets without Skin	1.30	0.480	0.296	0.109
	T3042037	Fillets without Skin	1.10	0.468	0.192	0.0819
	T3042038	Fillets without Skin	1.05	0.474	0.193	0.0872
	T3042039	Fillets without Skin	1.17	0.483	0.219	0.0903
	T3042040	Fillets without Skin	1.18	0.477	0.222	0.0897
	T3042041	Fillets without Skin	1.25	0.484	0.232	0.0900
	T3042042	Fillets without Skin	1.33	0.467	0.227	0.0799
	T3042043	Fillets without Skin	1.08	0.483	0.216	0.0966

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042044	Fillets without Skin	1.34	0.471	0.224	0.0787
	T3042045	Offal	2.87	0.462	0.761	0.122
	T3042046	Offal	3.86	0.456	1.08	0.127
	T3042047	Offal	4.14	0.467	1.05	0.118
	T3042048	Offal	2.71	0.472	0.650	0.113
	T3042049	Offal	2.66	0.462	0.593	0.103
	T3042050	Offal	3.60	0.461	0.878	0.112
	T3042051	Offal	2.94	0.363	0.767	0.0947
	T3042052	Offal	2.28	0.465	0.588	0.120
	T3042053	Offal	2.17	0.453	0.434	0.0906
	T3042054	Offal	2.92	0.327	0.791	0.0886
	T3042055	Offal	1.45	0.409	0.326	0.0920
	T3042056	Offal	2.04	0.457	0.490	0.110
	T3042057	Offal	1.30	0.310	0.381	0.0908
	T3042058	Offal	2.14	0.413	0.496	0.0958
	T3042059	Offal	1.32	0.336	0.375	0.0954
	T3042060	Offal	1.80	0.377	0.448	0.0939
	T3042017	Water			< 0.00500	0.00500
	T3042018	Water			< 0.00500	0.00500
	T3042019	Water			< 0.00500	0.00500
	T3042020	Water			< 0.00500	0.00500
	T3042021	Water			< 0.00500	0.00500
	T3042022	Water			< 0.00500	0.00500
	T3042023	Water			< 0.00500	0.00500
	T3042024	Water			< 0.00500	0.00500
	T3042025	Water			< 0.00500	0.00500
	T3042026	Water			< 0.00500	0.00500
	T3042027	Water			< 0.00500	0.00500

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042028	Water			< 0.00500	0.00500
Iron						
	T3042029	Fillets without Skin	14.6	0.942	3.31	0.214
	T3042030	Fillets without Skin	18.7	0.994	4.19	0.223
	T3042031	Fillets without Skin	17.2	0.912	3.80	0.202
	T3042032	Fillets without Skin	16.7	0.978	3.66	0.214
	T3042033	Fillets without Skin	29.4	0.969	6.03	0.199
	T3042034	Fillets without Skin	15.1	0.937	3.26	0.202
	T3042035	Fillets without Skin	12.4	0.959	2.81	0.218
	T3042036	Fillets without Skin	11.6	0.959	2.64	0.219
	T3042037	Fillets without Skin	20.8	0.937	3.64	0.164
	T3042038	Fillets without Skin	22.4	0.947	4.12	0.174
	T3042039	Fillets without Skin	16.0	0.965	2.99	0.180
	T3042040	Fillets without Skin	27.4	0.955	5.15	0.180
	T3042041	Fillets without Skin	16.5	0.968	3.07	0.180
	T3042042	Fillets without Skin	15.4	0.933	2.63	0.160
	T3042043	Fillets without Skin	8.49	0.967	1.70	0.193
	T3042044	Fillets without Skin	37.6	0.942	6.28	0.157

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042045	Offal	117	0.924	31.0	0.245
	T3042046	Offal	93.9	0.912	26.2	0.254
	T3042047	Offal	147	0.935	37.2	0.237
	T3042048	Offal	95.5	0.945	22.9	0.227
	T3042049	Offal	67.5	0.924	15.1	0.206
	T3042050	Offal	62.9	0.923	15.3	0.225
	T3042051	Offal	55.9	0.726	14.6	0.189
	T3042052	Offal	46.7	0.929	12.0	0.240
	T3042053	Offal	243	0.905	48.6	0.181
	T3042054	Offal	466	0.654	126	0.177
	T3042055	Offal	141	0.817	31.7	0.184
	T3042056	Offal	184	0.915	44.2	0.220
	T3042057	Offal	74.0	0.620	21.7	0.182
	T3042058	Offal	139	0.826	32.2	0.192
	T3042059	Offal	78.3	0.672	22.2	0.191
	T3042060	Offal	113	0.754	28.1	0.188
	T3042017	Water			0.0800	0.0100
	T3042018	Water			0.0800	0.0100
	T3042019	Water			< 0.0100	0.0100
	T3042020	Water			0.0500	0.0100
	T3042021	Water			0.0900	0.0100
	T3042022	Water			< 0.0100	0.0100
	T3042023	Water			0.0400	0.0100
	T3042024	Water			0.0800	0.0100
	T3042025	Water			0.0100	0.0100
	T3042026	Water			< 0.0100	0.0100
	T3042027	Water			< 0.0100	0.0100
	T3042028	Water			< 0.0100	0.0100
Mercury						

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042029	Fillets without Skin	0.489	0.00848	0.111	0.00192
	T3042030	Fillets without Skin	0.327	0.00895	0.0732	0.00200
	T3042031	Fillets without Skin	0.593	0.00821	0.131	0.00181
	T3042032	Fillets without Skin	0.184	0.00881	0.0403	0.00193
	T3042033	Fillets without Skin	0.277	0.00873	0.0568	0.00179
	T3042034	Fillets without Skin	0.297	0.00843	0.0642	0.00182
	T3042035	Fillets without Skin	0.332	0.00863	0.0754	0.00196
	T3042036	Fillets without Skin	0.392	0.00863	0.0894	0.00197
	T3042037	Fillets without Skin	2.53	0.00843	0.443	0.00148
	T3042038	Fillets without Skin	1.74	0.00852	0.320	0.00157
	T3042039	Fillets without Skin	2.12	0.00869	0.396	0.00162
	T3042040	Fillets without Skin	1.96	0.00859	0.368	0.00161
	T3042041	Fillets without Skin	0.0571	0.00871	0.0106	0.00162
	T3042042	Fillets without Skin	0.0437	0.00840	0.00747	0.00144
	T3042043	Fillets without Skin	0.0774	0.00870	0.0155	0.00174
	T3042044	Fillets without Skin	0.0488	0.00848	0.00815	0.00142
	T3042045	Offal	0.343	0.00831	0.0909	0.00220
	T3042046	Offal	0.243	0.00821	0.0678	0.00229

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042047	Offal	0.414	0.00841	0.105	0.00213
	T3042048	Offal	0.137	0.00850	0.0329	0.00204
	T3042049	Offal	0.201	0.00832	0.0448	0.00186
	T3042050	Offal	0.213	0.00831	0.0520	0.00203
	T3042051	Offal	0.252	0.00654	0.0658	0.00171
	T3042052	Offal	0.262	0.00836	0.0676	0.00216
	T3042053	Offal	1.08	0.00815	0.216	0.00163
	T3042054	Offal	0.783	0.00589	0.212	0.00160
	T3042055	Offal	1.16	0.00736	0.261	0.00166
	T3042056	Offal	0.773	0.00823	0.186	0.00198
	T3042057	Offal	0.0241	0.00587	0.00706	0.00172
	T3042058	Offal	0.0215	0.00743	0.00499	0.00172
	T3042059	Offal	0.0358	0.00605	0.0102	0.00172
	T3042060	Offal	0.0195	0.00678	0.00486	0.00169
	T3042017	Water			0.00000190	0.000000500
	T3042018	Water			0.00000189	0.000000500
	T3042019	Water			< 0.000000500	0.000000500
	T3042020	Water			0.00000178	0.000000500
	T3042021	Water			0.00000178	0.000000500
	T3042022	Water			0.00000114	0.000000500
	T3042023	Water			0.00000366	0.000000500
	T3042024	Water			0.00000359	0.000000500
	T3042025	Water			< 0.000000500	0.000000500
	T3042026	Water			< 0.000000500	0.000000500
	T3042027	Water			< 0.000000500	0.000000500
	T3042028	Water			< 0.000000500	0.000000500
Potassium						
	T3042029	Fillets without Skin	15200	9.42	3450	2.14

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042030	Fillets without Skin	15900	9.94	3560	2.23
	T3042031	Fillets without Skin	15300	9.12	3380	2.02
	T3042032	Fillets without Skin	15900	9.78	3480	2.14
	T3042033	Fillets without Skin	17400	9.69	3570	1.99
	T3042034	Fillets without Skin	16200	9.37	3500	2.02
	T3042035	Fillets without Skin	15600	9.59	3540	2.18
	T3042036	Fillets without Skin	15600	9.59	3560	2.19
	T3042037	Fillets without Skin	16300	9.37	2850	1.64
	T3042038	Fillets without Skin	15100	9.47	2780	1.74
	T3042039	Fillets without Skin	15800	9.65	2950	1.80
	T3042040	Fillets without Skin	15800	9.55	2970	1.80
	T3042041	Fillets without Skin	14900	9.68	2770	1.80
	T3042042	Fillets without Skin	15900	9.33	2720	1.60
	T3042043	Fillets without Skin	14700	9.67	2940	1.93
	T3042044	Fillets without Skin	16900	9.42	2820	1.57
	T3042045	Offal	10000	9.24	2650	2.45
	T3042046	Offal	9600	9.12	2680	2.54
	T3042047	Offal	10300	9.35	2610	2.37

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042048	Offal	11200	9.45	2690	2.27
	T3042049	Offal	12100	9.24	2700	2.06
	T3042050	Offal	11100	9.23	2710	2.25
	T3042051	Offal	10100	7.26	2640	1.89
	T3042052	Offal	10400	9.29	2680	2.40
	T3042053	Offal	9440	9.05	1890	1.81
	T3042054	Offal	7550	6.54	2050	1.77
	T3042055	Offal	10000	8.17	2250	1.84
	T3042056	Offal	8030	9.15	1930	2.20
	T3042057	Offal	7320	6.20	2140	1.82
	T3042058	Offal	9830	8.26	2280	1.92
	T3042059	Offal	8820	6.72	2500	1.91
	T3042060	Offal	7500	7.54	1870	1.88
	T3042017	Water			1.46	0.100
	T3042018	Water			1.48	0.100
	T3042019	Water			< 0.100	0.100
	T3042020	Water			2.68	0.100
	T3042021	Water			2.80	0.100
	T3042022	Water			< 0.100	0.100
	T3042023	Water			4.51	0.100
	T3042024	Water			4.57	0.100
	T3042025	Water			< 0.100	0.100
	T3042026	Water			7.28	0.100
	T3042027	Water			7.49	0.100
	T3042028	Water			< 0.100	0.100
Magnesium						
	T3042029	Fillets without Skin	1160	0.940	263	0.213
	T3042030	Fillets without	1220	0.990	273	0.222

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
		Skin				
	T3042031	Fillets without Skin	1130	0.910	250.	0.201
	T3042032	Fillets without Skin	1230	0.980	269	0.215
	T3042033	Fillets without Skin	1270	0.970	260.	0.199
	T3042034	Fillets without Skin	1270	0.940	274	0.203
	T3042035	Fillets without Skin	1290	0.960	293	0.218
	T3042036	Fillets without Skin	1280	0.960	292	0.219
	T3042037	Fillets without Skin	1050	0.940	184	0.164
	T3042038	Fillets without Skin	1040	0.950	191	0.175
	T3042039	Fillets without Skin	1060	0.970	198	0.181
	T3042040	Fillets without Skin	1070	0.950	201	0.179
	T3042041	Fillets without Skin	1090	0.970	203	0.180
	T3042042	Fillets without Skin	1110	0.930	190.	0.159
	T3042043	Fillets without Skin	1290	0.970	258	0.194
	T3042044	Fillets without Skin	1210	0.940	202	0.157
	T3042045	Offal	1010	0.920	268	0.244
	T3042046	Offal	950.	0.910	265	0.254
	T3042047	Offal	1190	0.930	301	0.235
	T3042048	Offal	1110	0.940	266	0.226

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042049	Offal	1220	0.920	272	0.205
	T3042050	Offal	1150	0.920	281	0.224
	T3042051	Offal	1240	0.730	324	0.191
	T3042052	Offal	1040	0.930	268	0.240
	T3042053	Offal	1420	0.910	284	0.182
	T3042054	Offal	1430	0.650	388	0.176
	T3042055	Offal	1980	0.820	446	0.184
	T3042056	Offal	1510	0.910	362	0.218
	T3042057	Offal	1510	0.620	442	0.182
	T3042058	Offal	1910	0.830	443	0.193
	T3042059	Offal	2270	0.670	645	0.190
	T3042060	Offal	1180	0.750	294	0.187
	T3042017	Water			2.87	0.0100
	T3042018	Water			2.88	0.0100
	T3042019	Water			< 0.0100	0.0100
	T3042020	Water			13.6	0.0100
	T3042021	Water			14.1	0.0100
	T3042022	Water			0.0100	0.0100
	T3042023	Water			9.29	0.0100
	T3042024	Water			9.39	0.0100
	T3042025	Water			< 0.0100	0.0100
	T3042026	Water			35.8	0.0100
	T3042027	Water			36.7	0.0100
	T3042028	Water			0.0200	0.0100
Manganese						
	T3042029	Fillets without Skin	0.556	0.188	0.126	0.0427
	T3042030	Fillets without Skin	0.616	0.199	0.138	0.0446

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042031	Fillets without Skin	0.511	0.182	0.113	0.0402
	T3042032	Fillets without Skin	0.841	0.196	0.184	0.0429
	T3042033	Fillets without Skin	0.717	0.194	0.147	0.0398
	T3042034	Fillets without Skin	0.768	0.187	0.166	0.0404
	T3042035	Fillets without Skin	0.844	0.192	0.192	0.0436
	T3042036	Fillets without Skin	0.652	0.192	0.149	0.0438
	T3042037	Fillets without Skin	0.778	0.187	0.136	0.0327
	T3042038	Fillets without Skin	0.625	0.189	0.115	0.0348
	T3042039	Fillets without Skin	0.531	0.193	0.0993	0.0361
	T3042040	Fillets without Skin	0.725	0.191	0.136	0.0359
	T3042041	Fillets without Skin	0.735	0.194	0.137	0.0361
	T3042042	Fillets without Skin	0.672	0.187	0.115	0.0320
	T3042043	Fillets without Skin	0.300	0.193	0.0600	0.0386
	T3042044	Fillets without Skin	1.47	0.188	0.245	0.0314
	T3042045	Offal	36.4	0.185	9.65	0.0490
	T3042046	Offal	10.0	0.182	2.79	0.0508
	T3042047	Offal	55.4	0.187	14.0	0.0473
	T3042048	Offal	10.2	0.189	2.45	0.0454
	T3042049	Offal	5.47	0.185	1.22	0.0413

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042050	Offal	5.01	0.185	1.22	0.0451
	T3042051	Offal	5.24	0.145	1.37	0.0378
	T3042052	Offal	3.79	0.186	0.978	0.0480
	T3042053	Offal	76.9	0.181	15.4	0.0362
	T3042054	Offal	46.7	0.131	12.7	0.0355
	T3042055	Offal	44.7	0.163	10.1	0.0367
	T3042056	Offal	30.2	0.183	7.25	0.0439
	T3042057	Offal	11.6	0.124	3.40	0.0363
	T3042058	Offal	26.4	0.165	6.12	0.0383
	T3042059	Offal	6.93	0.134	1.97	0.0381
	T3042060	Offal	5.77	0.151	1.44	0.0376
	T3042017	Water			0.0110	0.00200
	T3042018	Water			0.0120	0.00200
	T3042019	Water			< 0.00200	0.00200
	T3042020	Water			0.00300	0.00200
	T3042021	Water			0.00400	0.00200
	T3042022	Water			< 0.00200	0.00200
	T3042023	Water			< 0.00200	0.00200
	T3042024	Water			0.00200	0.00200
	T3042025	Water			< 0.00200	0.00200
	T3042026	Water			< 0.00200	0.00200
	T3042027	Water			< 0.00200	0.00200
	T3042028	Water			< 0.00200	0.00200
Molybdenum						
	T3042029	Fillets without Skin	< 0.942	0.942	< 0.214	0.214
	T3042030	Fillets without Skin	< 0.994	0.994	< 0.223	0.223
	T3042031	Fillets without Skin	< 0.912	0.912	< 0.202	0.202

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042032	Fillets without Skin	< 0.978	0.978	< 0.214	0.214
	T3042033	Fillets without Skin	< 0.969	0.969	< 0.199	0.199
	T3042034	Fillets without Skin	< 0.937	0.937	< 0.202	0.202
	T3042035	Fillets without Skin	< 0.959	0.959	< 0.218	0.218
	T3042036	Fillets without Skin	< 0.959	0.959	< 0.219	0.219
	T3042037	Fillets without Skin	< 0.937	0.937	< 0.164	0.164
	T3042038	Fillets without Skin	< 0.947	0.947	< 0.174	0.174
	T3042039	Fillets without Skin	< 0.965	0.965	< 0.180	0.180
	T3042040	Fillets without Skin	< 0.955	0.955	< 0.180	0.180
	T3042041	Fillets without Skin	< 0.968	0.968	< 0.180	0.180
	T3042042	Fillets without Skin	< 0.933	0.933	< 0.160	0.160
	T3042043	Fillets without Skin	< 0.967	0.967	< 0.193	0.193
	T3042044	Fillets without Skin	< 0.942	0.942	< 0.157	0.157
	T3042045	Offal	< 0.924	0.924	< 0.245	0.245
	T3042046	Offal	< 0.912	0.912	< 0.254	0.254
	T3042047	Offal	< 0.935	0.935	< 0.237	0.237
	T3042048	Offal	< 0.945	0.945	< 0.227	0.227
	T3042049	Offal	< 0.924	0.924	< 0.206	0.206
	T3042050	Offal	< 0.923	0.923	< 0.225	0.225
	T3042051	Offal	< 0.726	0.726	< 0.189	0.189

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042052	Offal	< 0.929	0.929	< 0.240	0.240
	T3042053	Offal	< 0.905	0.905	< 0.181	0.181
	T3042054	Offal	< 0.654	0.654	< 0.177	0.177
	T3042055	Offal	< 0.817	0.817	< 0.184	0.184
	T3042056	Offal	< 0.915	0.915	< 0.220	0.220
	T3042057	Offal	< 0.620	0.620	< 0.182	0.182
	T3042058	Offal	< 0.826	0.826	< 0.192	0.192
	T3042059	Offal	< 0.672	0.672	< 0.191	0.191
	T3042060	Offal	< 0.754	0.754	< 0.188	0.188
	T3042017	Water			< 0.0100	0.0100
	T3042018	Water			< 0.0100	0.0100
	T3042019	Water			< 0.0100	0.0100
	T3042020	Water			< 0.0100	0.0100
	T3042021	Water			< 0.0100	0.0100
	T3042022	Water			< 0.0100	0.0100
	T3042023	Water			< 0.0100	0.0100
	T3042024	Water			< 0.0100	0.0100
	T3042025	Water			< 0.0100	0.0100
	T3042026	Water			< 0.0100	0.0100
	T3042027	Water			0.0100	0.0100
	T3042028	Water			< 0.0100	0.0100
Sodium						
	T3042029	Fillets without Skin	925	188	210.	42.7
	T3042030	Fillets without Skin	1130	199	253	44.6
	T3042031	Fillets without Skin	1070	182	236	40.2
	T3042032	Fillets without Skin	1210	196	265	42.9

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042033	Fillets without Skin	1310	194	269	39.8
	T3042034	Fillets without Skin	1240	187	268	40.4
	T3042035	Fillets without Skin	1190	192	270.	43.6
	T3042036	Fillets without Skin	1150	192	262	43.8
	T3042037	Fillets without Skin	2110	187	369	32.7
	T3042038	Fillets without Skin	1810	189	333	34.8
	T3042039	Fillets without Skin	1790	193	335	36.1
	T3042040	Fillets without Skin	1890	191	355	35.9
	T3042041	Fillets without Skin	1720	194	320.	36.1
	T3042042	Fillets without Skin	2060	187	352	32.0
	T3042043	Fillets without Skin	1450	193	290.	38.6
	T3042044	Fillets without Skin	1950	188	326	31.4
	T3042045	Offal	3520	185	933	49.0
	T3042046	Offal	3310	182	923	50.8
	T3042047	Offal	3830	187	969	47.3
	T3042048	Offal	4060	189	974	45.4
	T3042049	Offal	5040	185	1120	41.3
	T3042050	Offal	4290	185	1050	45.1
	T3042051	Offal	3520	145	919	37.8
	T3042052	Offal	3420	186	882	48.0
	T3042053	Offal	7690	181	1540	36.2

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042054	Offal	4930	131	1340	35.5
	T3042055	Offal	6210	163	1400	36.7
	T3042056	Offal	6300	183	1510	43.9
	T3042057	Offal	4660	124	1370	36.3
	T3042058	Offal	6020	165	1400	38.3
	T3042059	Offal	4820	134	1370	38.1
	T3042060	Offal	5120	151	1270	37.6
	T3042017	Water			3.00	2.00
	T3042018	Water			4.00	2.00
	T3042019	Water			< 2.00	2.00
	T3042020	Water			31.4	2.00
	T3042021	Water			33.6	2.00
	T3042022	Water			< 2.00	2.00
	T3042023	Water			65.0	2.00
	T3042024	Water			66.0	2.00
	T3042025	Water			< 2.00	2.00
	T3042026	Water			99.9	2.00
	T3042027	Water			106	2.00
	T3042028	Water			< 2.00	2.00
Nickel						
	T3042029	Fillets without Skin	< 0.471	0.471	< 0.107	0.107
	T3042030	Fillets without Skin	< 0.497	0.497	< 0.111	0.111
	T3042031	Fillets without Skin	< 0.456	0.456	< 0.101	0.101
	T3042032	Fillets without Skin	< 0.489	0.489	< 0.107	0.107
	T3042033	Fillets without Skin	< 0.485	0.485	< 0.0994	0.0994

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042034	Fillets without Skin	< 0.468	0.468	< 0.101	0.101
	T3042035	Fillets without Skin	< 0.480	0.480	< 0.109	0.109
	T3042036	Fillets without Skin	< 0.480	0.480	< 0.109	0.109
	T3042037	Fillets without Skin	< 0.468	0.468	< 0.0819	0.0819
	T3042038	Fillets without Skin	< 0.474	0.474	< 0.0872	0.0872
	T3042039	Fillets without Skin	< 0.483	0.483	< 0.0903	0.0903
	T3042040	Fillets without Skin	< 0.477	0.477	< 0.0897	0.0897
	T3042041	Fillets without Skin	< 0.484	0.484	< 0.0900	0.0900
	T3042042	Fillets without Skin	< 0.467	0.467	< 0.0799	0.0799
	T3042043	Fillets without Skin	< 0.483	0.483	< 0.0966	0.0966
	T3042044	Fillets without Skin	< 0.471	0.471	< 0.0787	0.0787
	T3042045	Offal	< 0.462	0.462	< 0.122	0.122
	T3042046	Offal	0.661	0.456	0.184	0.127
	T3042047	Offal	< 0.467	0.467	< 0.118	0.118
	T3042048	Offal	< 0.472	0.472	< 0.113	0.113
	T3042049	Offal	< 0.462	0.462	< 0.103	0.103
	T3042050	Offal	< 0.461	0.461	< 0.112	0.112
	T3042051	Offal	0.497	0.363	0.130	0.0947
	T3042052	Offal	0.737	0.465	0.190	0.120
	T3042053	Offal	1.84	0.453	0.368	0.0906
	T3042054	Offal	1.37	0.327	0.371	0.0886

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042055	Offal	1.08	0.409	0.243	0.0920
	T3042056	Offal	1.36	0.457	0.326	0.110
	T3042057	Offal	1.30	0.310	0.381	0.0908
	T3042058	Offal	1.15	0.413	0.267	0.0958
	T3042059	Offal	2.33	0.336	0.662	0.0954
	T3042060	Offal	0.970	0.377	0.242	0.0939
	T3042017	Water			< 0.00500	0.00500
	T3042018	Water			< 0.00500	0.00500
	T3042019	Water			< 0.00500	0.00500
	T3042020	Water			< 0.00500	0.00500
	T3042021	Water			< 0.00500	0.00500
	T3042022	Water			< 0.00500	0.00500
	T3042023	Water			< 0.00500	0.00500
	T3042024	Water			< 0.00500	0.00500
	T3042025	Water			< 0.00500	0.00500
	T3042026	Water			< 0.00500	0.00500
	T3042027	Water			< 0.00500	0.00500
	T3042028	Water			< 0.00500	0.00500
Phosphorus						
	T3042029	Fillets without Skin	11000	4.71	2500	1.07
	T3042030	Fillets without Skin	11500	4.97	2580	1.11
	T3042031	Fillets without Skin	10900	4.56	2410	1.01
	T3042032	Fillets without Skin	11700	4.89	2560	1.07
	T3042033	Fillets without Skin	12300	4.85	2520	0.994
	T3042034	Fillets without Skin	12400	4.68	2680	1.01

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042035	Fillets without Skin	11800	4.80	2680	1.09
	T3042036	Fillets without Skin	11400	4.80	2600	1.09
	T3042037	Fillets without Skin	10500	4.68	1840	0.819
	T3042038	Fillets without Skin	9840	4.74	1810	0.872
	T3042039	Fillets without Skin	10400	4.83	1940	0.903
	T3042040	Fillets without Skin	10400	4.77	1960	0.897
	T3042041	Fillets without Skin	9980	4.84	1860	0.900
	T3042042	Fillets without Skin	10600	4.67	1810	0.799
	T3042043	Fillets without Skin	9980	4.83	2000	0.966
	T3042044	Fillets without Skin	11200	4.71	1870	0.787
	T3042045	Offal	17500	4.62	4640	1.22
	T3042046	Offal	17800	4.56	4970	1.27
	T3042047	Offal	20500	4.67	5190	1.18
	T3042048	Offal	19700	4.72	4730	1.13
	T3042049	Offal	22900	4.62	5110	1.03
	T3042050	Offal	19700	4.61	4810	1.12
	T3042051	Offal	22000	3.63	5740	0.947
	T3042052	Offal	18500	4.65	4770	1.20
	T3042053	Offal	29500	4.53	5900	0.906
	T3042054	Offal	26100	3.27	7070	0.886
	T3042055	Offal	49100	4.09	11000	0.920
	T3042056	Offal	36400	4.57	8740	1.10

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042057	Offal	31900	3.10	9350	0.908
	T3042058	Offal	38000	4.13	8820	0.958
	T3042059	Offal	45300	3.36	12900	0.954
	T3042060	Offal	21200	3.77	5280	0.939
	T3042017	Water			0.0800	0.0500
	T3042018	Water			0.0800	0.0500
	T3042019	Water			< 0.0500	0.0500
	T3042020	Water			0.125	0.0500
	T3042021	Water			0.151	0.0500
	T3042022	Water			< 0.0500	0.0500
	T3042023	Water			0.103	0.0500
	T3042024	Water			0.112	0.0500
	T3042025	Water			< 0.0500	0.0500
	T3042026	Water			< 0.0500	0.0500
	T3042027	Water			< 0.0500	0.0500
	T3042028	Water			< 0.0500	0.0500
Lead						
	T3042029	Fillets without Skin	0.234	0.0471	0.0531	0.0107
	T3042030	Fillets without Skin	0.215	0.0497	0.0482	0.0111
	T3042031	Fillets without Skin	0.182	0.0456	0.0402	0.0101
	T3042032	Fillets without Skin	0.223	0.0489	0.0488	0.0107
	T3042033	Fillets without Skin	0.201	0.0485	0.0412	0.00994
	T3042034	Fillets without Skin	0.183	0.0468	0.0395	0.0101
	T3042035	Fillets without Skin	0.188	0.0480	0.0427	0.0109

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042036	Fillets without Skin	0.172	0.0480	0.0392	0.0109
	T3042037	Fillets without Skin	0.152	0.0468	0.0266	0.00819
	T3042038	Fillets without Skin	0.159	0.0474	0.0293	0.00872
	T3042039	Fillets without Skin	0.153	0.0483	0.0286	0.00903
	T3042040	Fillets without Skin	0.159	0.0477	0.0299	0.00897
	T3042041	Fillets without Skin	0.144	0.0484	0.0268	0.00900
	T3042042	Fillets without Skin	0.121	0.0467	0.0207	0.00799
	T3042043	Fillets without Skin	0.128	0.0483	0.0256	0.00966
	T3042044	Fillets without Skin	0.234	0.0471	0.0391	0.00787
	T3042045	Offal	0.124	0.0462	0.0329	0.0122
	T3042046	Offal	0.138	0.0456	0.0385	0.0127
	T3042047	Offal	0.157	0.0467	0.0397	0.0118
	T3042048	Offal	0.110	0.0472	0.0264	0.0113
	T3042049	Offal	0.113	0.0462	0.0252	0.0103
	T3042050	Offal	0.113	0.0461	0.0276	0.0112
	T3042051	Offal	0.0841	0.0363	0.0220	0.00947
	T3042052	Offal	0.0767	0.0465	0.0198	0.0120
	T3042053	Offal	0.388	0.0453	0.0776	0.00906
	T3042054	Offal	0.569	0.0327	0.154	0.00886
	T3042055	Offal	0.315	0.0409	0.0709	0.00920
	T3042056	Offal	0.296	0.0457	0.0710	0.0110
	T3042057	Offal	0.306	0.0310	0.0897	0.00908
	T3042058	Offal	0.331	0.0413	0.0768	0.00958

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042059	Offal	0.121	0.0336	0.0344	0.00954
	T3042060	Offal	0.208	0.0377	0.0518	0.00939
	T3042017	Water			0.000180	0.0000500
	T3042018	Water			0.000140	0.0000500
	T3042019	Water			0.0000700	0.0000500
	T3042020	Water			0.0000900	0.0000500
	T3042021	Water			0.000100	0.0000500
	T3042022	Water			0.0000500	0.0000500
	T3042023	Water			0.0000700	0.0000500
	T3042024	Water			0.0000900	0.0000500
	T3042025	Water			< 0.0000500	0.0000500
	T3042026	Water			0.000150	0.0000500
	T3042027	Water			0.000150	0.0000500
	T3042028	Water			< 0.0000500	0.0000500
Sulfur						
	T3042029	Fillets without Skin	8340	9.40	1890	2.13
	T3042030	Fillets without Skin	8430	9.90	1890	2.22
	T3042031	Fillets without Skin	8270	9.10	1830	2.01
	T3042032	Fillets without Skin	8160	9.80	1790	2.15
	T3042033	Fillets without Skin	8350	9.70	1710	1.99
	T3042034	Fillets without Skin	8400	9.40	1810	2.03
	T3042035	Fillets without Skin	8220	9.60	1870	2.18
	T3042036	Fillets without Skin	8470	9.60	1930	2.19

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042037	Fillets without Skin	9690	9.40	1700	1.64
	T3042038	Fillets without Skin	9320	9.50	1710	1.75
	T3042039	Fillets without Skin	9850	9.70	1840	1.81
	T3042040	Fillets without Skin	9530	9.50	1790	1.79
	T3042041	Fillets without Skin	10800	9.70	2010	1.80
	T3042042	Fillets without Skin	11600	9.30	1980	1.59
	T3042043	Fillets without Skin	10800	9.70	2160	1.94
	T3042044	Fillets without Skin	12200	9.40	2040	1.57
	T3042045	Offal	7320	9.20	1940	2.44
	T3042046	Offal	6860	9.10	1910	2.54
	T3042047	Offal	7500	9.30	1900	2.35
	T3042048	Offal	7470	9.40	1790	2.26
	T3042049	Offal	8200	9.20	1830	2.05
	T3042050	Offal	7840	9.20	1910	2.24
	T3042051	Offal	7660	7.30	2000	1.91
	T3042052	Offal	7090	9.30	1830	2.40
	T3042053	Offal	6870	9.10	1370	1.82
	T3042054	Offal	6280	6.50	1700	1.76
	T3042055	Offal	6980	8.20	1570	1.84
	T3042056	Offal	5680	9.10	1360	2.18
	T3042057	Offal	6010	6.20	1760	1.82
	T3042058	Offal	7880	8.30	1830	1.93
	T3042059	Offal	8080	6.70	2290	1.90

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042060	Offal	6780	7.50	1690	1.87
	T3042017	Water			1.50	0.100
	T3042018	Water			1.60	0.100
	T3042019	Water			< 0.100	0.100
	T3042020	Water			6.20	0.100
	T3042021	Water			6.50	0.100
	T3042022	Water			< 0.100	0.100
	T3042023	Water			10.7	0.100
	T3042024	Water			11.0	0.100
	T3042025	Water			< 0.100	0.100
	T3042026	Water			138	0.100
	T3042027	Water			141	0.100
	T3042028	Water			< 0.100	0.100
Selenium						
	T3042029	Fillets without Skin	1.25	0.0235	0.284	0.00534
	T3042030	Fillets without Skin	1.14	0.0249	0.255	0.00557
	T3042031	Fillets without Skin	1.16	0.0228	0.256	0.00504
	T3042032	Fillets without Skin	1.23	0.0245	0.269	0.00536
	T3042033	Fillets without Skin	1.22	0.0242	0.250	0.00497
	T3042034	Fillets without Skin	1.09	0.0234	0.235	0.00506
	T3042035	Fillets without Skin	1.06	0.0240	0.241	0.00544
	T3042036	Fillets without Skin	1.17	0.0240	0.267	0.00547
	T3042037	Fillets without Skin	0.886	0.0234	0.155	0.00410

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042038	Fillets without Skin	0.849	0.0237	0.156	0.00436
	T3042039	Fillets without Skin	0.881	0.0241	0.165	0.00451
	T3042040	Fillets without Skin	0.848	0.0239	0.159	0.00449
	T3042041	Fillets without Skin	15.1	0.0242	2.81	0.00450
	T3042042	Fillets without Skin	21.0	0.140	3.59	0.0239
	T3042043	Fillets without Skin	17.2	0.145	3.44	0.0290
	T3042044	Fillets without Skin	23.1	0.141	3.86	0.0235
	T3042045	Offal	1.39	0.0231	0.368	0.00612
	T3042046	Offal	1.38	0.0228	0.385	0.00636
	T3042047	Offal	1.28	0.0234	0.324	0.00591
	T3042048	Offal	1.39	0.0236	0.334	0.00567
	T3042049	Offal	1.42	0.0231	0.317	0.00515
	T3042050	Offal	1.24	0.0231	0.303	0.00563
	T3042051	Offal	1.48	0.0182	0.386	0.00474
	T3042052	Offal	1.54	0.0232	0.397	0.00599
	T3042053	Offal	1.69	0.0226	0.338	0.00453
	T3042054	Offal	1.63	0.0164	0.442	0.00443
	T3042055	Offal	1.39	0.0204	0.313	0.00460
	T3042056	Offal	1.60	0.0229	0.384	0.00549
	T3042057	Offal	8.95	0.0155	2.62	0.00454
	T3042058	Offal	12.5	0.0206	2.90	0.00479
	T3042059	Offal	12.1	0.101	3.44	0.0287
	T3042060	Offal	12.0	0.0188	2.99	0.00469
	T3042017	Water			0.000480	0.000400

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042018	Water			0.000460	0.000400
	T3042019	Water			< 0.000400	0.000400
	T3042020	Water			0.000450	0.000400
	T3042021	Water			0.000470	0.000400
	T3042022	Water			< 0.000400	0.000400
	T3042023	Water			0.000520	0.000400
	T3042024	Water			0.000520	0.000400
	T3042025	Water			< 0.000400	0.000400
	T3042026	Water			0.00128	0.000400
	T3042027	Water			0.00130	0.000400
	T3042028	Water			0.000420	0.000400
Strontium						
	T3042029	Fillets without Skin	0.603	0.0471	0.137	0.0107
	T3042030	Fillets without Skin	0.945	0.0497	0.212	0.0111
	T3042031	Fillets without Skin	0.511	0.0456	0.113	0.0101
	T3042032	Fillets without Skin	1.56	0.0489	0.342	0.0107
	T3042033	Fillets without Skin	3.57	0.0485	0.732	0.00994
	T3042034	Fillets without Skin	7.64	0.0468	1.65	0.0101
	T3042035	Fillets without Skin	3.04	0.0480	0.690	0.0109
	T3042036	Fillets without Skin	1.06	0.0480	0.242	0.0109
	T3042037	Fillets without Skin	1.74	0.0468	0.304	0.00819
	T3042038	Fillets without Skin	1.74	0.0474	0.320	0.00872

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042039	Fillets without Skin	1.37	0.0483	0.256	0.00903
	T3042040	Fillets without Skin	1.82	0.0477	0.342	0.00897
	T3042041	Fillets without Skin	2.60	0.0484	0.484	0.00900
	T3042042	Fillets without Skin	2.38	0.0467	0.407	0.00799
	T3042043	Fillets without Skin	5.63	0.0483	1.13	0.00966
	T3042044	Fillets without Skin	3.92	0.0471	0.655	0.00787
	T3042045	Offal	29.4	0.0462	7.79	0.0122
	T3042046	Offal	28.4	0.0456	7.92	0.0127
	T3042047	Offal	41.1	0.0467	10.4	0.0118
	T3042048	Offal	31.1	0.0472	7.46	0.0113
	T3042049	Offal	66.6	0.0462	14.9	0.0103
	T3042050	Offal	67.6	0.0461	16.5	0.0112
	T3042051	Offal	53.7	0.0363	14.0	0.00947
	T3042052	Offal	43.7	0.0465	11.3	0.0120
	T3042053	Offal	190.	0.0453	38.0	0.00906
	T3042054	Offal	185	0.0327	50.1	0.00886
	T3042055	Offal	293	0.0409	65.9	0.00920
	T3042056	Offal	231	0.0457	55.4	0.0110
	T3042057	Offal	280.	0.0310	82.0	0.00908
	T3042058	Offal	338	0.0413	78.4	0.00958
	T3042059	Offal	488	0.0336	139	0.00954
	T3042060	Offal	179	0.0377	44.6	0.00939
	T3042017	Water			0.120	0.000500
	T3042018	Water			0.125	0.000500
	T3042019	Water			< 0.000500	0.000500

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042020	Water			0.414	0.000500
	T3042021	Water			0.438	0.000500
	T3042022	Water			< 0.000500	0.000500
	T3042023	Water			0.339	0.000500
	T3042024	Water			0.343	0.000500
	T3042025	Water			< 0.000500	0.000500
	T3042026	Water			1.66	0.000500
	T3042027	Water			1.76	0.000500
	T3042028	Water			0.000800	0.000500
Vanadium						
	T3042029	Fillets without Skin	< 0.942	0.942	< 0.214	0.214
	T3042030	Fillets without Skin	< 0.994	0.994	< 0.223	0.223
	T3042031	Fillets without Skin	< 0.912	0.912	< 0.202	0.202
	T3042032	Fillets without Skin	< 0.978	0.978	< 0.214	0.214
	T3042033	Fillets without Skin	< 0.969	0.969	< 0.199	0.199
	T3042034	Fillets without Skin	< 0.937	0.937	< 0.202	0.202
	T3042035	Fillets without Skin	< 0.959	0.959	< 0.218	0.218
	T3042036	Fillets without Skin	< 0.959	0.959	< 0.219	0.219
	T3042037	Fillets without Skin	< 0.937	0.937	< 0.164	0.164
	T3042038	Fillets without Skin	< 0.947	0.947	< 0.174	0.174
	T3042039	Fillets without Skin	< 0.965	0.965	< 0.180	0.180

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042040	Fillets without Skin	< 0.955	0.955	< 0.180	0.180
	T3042041	Fillets without Skin	< 0.968	0.968	< 0.180	0.180
	T3042042	Fillets without Skin	< 0.933	0.933	< 0.160	0.160
	T3042043	Fillets without Skin	< 0.967	0.967	< 0.193	0.193
	T3042044	Fillets without Skin	< 0.942	0.942	< 0.157	0.157
	T3042045	Offal	< 0.924	0.924	< 0.245	0.245
	T3042046	Offal	< 0.912	0.912	< 0.254	0.254
	T3042047	Offal	< 0.935	0.935	< 0.237	0.237
	T3042048	Offal	< 0.945	0.945	< 0.227	0.227
	T3042049	Offal	< 0.924	0.924	< 0.206	0.206
	T3042050	Offal	< 0.923	0.923	< 0.225	0.225
	T3042051	Offal	< 0.726	0.726	< 0.189	0.189
	T3042052	Offal	< 0.929	0.929	< 0.240	0.240
	T3042053	Offal	1.82	0.905	0.364	0.181
	T3042054	Offal	2.34	0.654	0.634	0.177
	T3042055	Offal	1.58	0.817	0.356	0.184
	T3042056	Offal	1.48	0.915	0.355	0.220
	T3042057	Offal	1.04	0.620	0.305	0.182
	T3042058	Offal	0.897	0.826	0.208	0.192
	T3042059	Offal	< 0.672	0.672	< 0.191	0.191
	T3042060	Offal	< 0.754	0.754	< 0.188	0.188
	T3042017	Water			< 0.0100	0.0100
	T3042018	Water			< 0.0100	0.0100
	T3042019	Water			< 0.0100	0.0100
	T3042020	Water			< 0.0100	0.0100

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042021	Water			< 0.0100	0.0100
	T3042022	Water			< 0.0100	0.0100
	T3042023	Water			0.0100	0.0100
	T3042024	Water			0.0100	0.0100
	T3042025	Water			< 0.0100	0.0100
	T3042026	Water			< 0.0100	0.0100
	T3042027	Water			< 0.0100	0.0100
	T3042028	Water			< 0.0100	0.0100
Zinc						
	T3042029	Fillets without Skin	13.3	0.471	3.02	0.107
	T3042030	Fillets without Skin	16.6	0.497	3.72	0.111
	T3042031	Fillets without Skin	14.8	0.456	3.27	0.101
	T3042032	Fillets without Skin	19.7	0.489	4.31	0.107
	T3042033	Fillets without Skin	16.3	0.485	3.34	0.0994
	T3042034	Fillets without Skin	16.0	0.468	3.46	0.101
	T3042035	Fillets without Skin	15.8	0.480	3.59	0.109
	T3042036	Fillets without Skin	17.7	0.480	4.04	0.109
	T3042037	Fillets without Skin	21.9	0.468	3.83	0.0819
	T3042038	Fillets without Skin	21.1	0.474	3.88	0.0872
	T3042039	Fillets without Skin	20.2	0.483	3.78	0.0903
	T3042040	Fillets without Skin	20.7	0.477	3.89	0.0897

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042041	Fillets without Skin	22.5	0.484	4.18	0.0900
	T3042042	Fillets without Skin	24.2	0.467	4.14	0.0799
	T3042043	Fillets without Skin	18.8	0.483	3.76	0.0966
	T3042044	Fillets without Skin	24.9	0.471	4.16	0.0787
	T3042045	Offal	83.0	0.462	22.0	0.122
	T3042046	Offal	86.6	0.456	24.2	0.127
	T3042047	Offal	102	0.467	25.8	0.118
	T3042048	Offal	102	0.472	24.5	0.113
	T3042049	Offal	131	0.462	29.2	0.103
	T3042050	Offal	103	0.461	25.1	0.112
	T3042051	Offal	87.8	0.363	22.9	0.0947
	T3042052	Offal	74.9	0.465	19.3	0.120
	T3042053	Offal	84.4	0.453	16.9	0.0906
	T3042054	Offal	66.7	0.327	18.1	0.0886
	T3042055	Offal	103	0.409	23.2	0.0920
	T3042056	Offal	90.1	0.457	21.6	0.110
	T3042057	Offal	82.5	0.310	24.2	0.0908
	T3042058	Offal	127	0.413	29.5	0.0958
	T3042059	Offal	64.0	0.336	18.2	0.0954
	T3042060	Offal	70.7	0.377	17.6	0.0939
	T3042017	Water			< 0.00500	0.00500
	T3042018	Water			< 0.00500	0.00500
	T3042019	Water			0.0260	0.00500
	T3042020	Water			< 0.00500	0.00500
	T3042021	Water			< 0.00500	0.00500
	T3042022	Water			0.0310	0.00500

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042023	Water			< 0.00500	0.00500
	T3042024	Water			< 0.00500	0.00500
	T3042025	Water			0.00800	0.00500
	T3042026	Water			< 0.00500	0.00500
	T3042027	Water			< 0.00500	0.00500
	T3042028	Water			0.0210	0.00500
Methyl Mercury						
	T3042029	Fillets without Skin	0.482	0.00949	0.109	0.00215
	T3042030	Fillets without Skin	0.293	0.000800	0.0656	0.000179
	T3042031	Fillets without Skin	0.311	0.000900	0.0687	0.000199
	T3042032	Fillets without Skin	0.137	0.000850	0.0300	0.000186
	T3042033	Fillets without Skin	0.292	0.000870	0.0599	0.000178
	T3042034	Fillets without Skin	0.343	0.00417	0.0741	0.000901
	T3042035	Fillets without Skin	0.380	0.00449	0.0863	0.00102
	T3042036	Fillets without Skin	0.417	0.00442	0.0951	0.00101
	T3042037	Fillets without Skin	2.69	0.00958	0.471	0.00168
	T3042038	Fillets without Skin	1.64	0.00989	0.302	0.00182
	T3042039	Fillets without Skin	2.44	0.00941	0.456	0.00176
	T3042040	Fillets without Skin	1.87	0.0106	0.352	0.00199
	T3042041	Fillets without Skin	0.0591	0.00178	0.0110	0.000331

Analyte	Sample Number	Sample Matrix	Dry Weight (ppm)	DL Dry Weight (ppm)	Wet Weight (ppm)	DL Wet Weight (ppm)
	T3042042	Fillets without Skin	0.0349	0.00189	0.00597	0.000323
	T3042043	Fillets without Skin	0.0816	0.00170	0.0163	0.000340
	T3042044	Fillets without Skin	0.0441	0.00183	0.00736	0.000306
	T3042001	Water			0.0000000580	0.0000000110
	T3042002	Water			0.0000000710	0.0000000110
	T3042003	Water			0.0000000770	0.0000000110
	T3042004	Water			0.0000000880	0.0000000110
	T3042005	Water			0.000000134	0.0000000110
	T3042006	Water			0.000000143	0.0000000110
	T3042007	Water			0.000000159	0.0000000110
	T3042008	Water			0.000000159	0.0000000110
	T3042009	Water			0.000000418	0.0000000110
	T3042010	Water			0.000000152	0.0000000110
	T3042011	Water			0.0000000680	0.0000000110
	T3042012	Water			< 0.0000000110	0.0000000110
	T3042013	Water			0.0000000370	0.0000000110
	T3042014	Water			0.0000000170	0.0000000110
	T3042015	Water			0.0000000230	0.0000000110
	T3042016	Water			0.0000000200	0.0000000110

5. Procedural Blanks

Analyte	Lab Sample Number	Lab Sample Matrix	Result Total UG	** BEC (ppm/%)	Basis
Silver					
	Bla15819	Water	0.000606	< 0.000200	Wet
Aluminum					
	Bla15571	Animal Tissue	0.340	< 4.82	Dry
	Bla15576	Animal Tissue	0.767	< 4.11	Dry
	Bla15819	Water	-0.00660	< 0.00100	Wet
Arsenic					
	Bla15576	Animal Tissue	-0.00455	< 1.64	Dry
	Bla16043	Water	0.0000861	< 0.000200	Wet
	Bla16048	Animal Tissue	0.0288	< 0.193	Dry
Boron					
	Bla15571	Animal Tissue	0.0752	< 0.966	Dry
	Bla15576	Animal Tissue	0.0851	< 0.823	Dry
	Bla15819	Water	-0.0000564	< 0.000200	Wet
Barium					
	Bla15571	Animal Tissue	-0.00197	< 0.0981	Dry
	Bla15576	Animal Tissue	0.00572	< 0.0819	Dry
	Bla15819	Water	0.000	< 0.0000200	Wet
Beryllium					
	Bla15571	Animal Tissue	0.00196	< 0.0480	Dry
	Bla15576	Animal Tissue	0.00190	< 0.0410	Dry
	Bla15819	Water	0.000000300	< 0.0000100	Wet
Calcium					
	Bla15571	Animal Tissue	1.19	5.86	Dry
	Bla15576	Animal Tissue	0.595	< 4.10	Dry
	Bla15819	Water	0.00150	< 0.000400	Wet
Cadmium					
	Bla16043	Water	0.00000560	< 0.0000500	Wet
	Bla16048	Animal Tissue	0.00107	< 0.0482	Dry
	Bla16053	Animal Tissue	0.00123	< 0.0411	Dry

Analyte	Lab Sample Number	Lab Sample Matrix	Result Total UG	** BEC (ppm/%)	Basis
Cobalt					
	Bla15571	Animal Tissue	0.0393	< 0.480	Dry
	Bla15576	Animal Tissue	0.00358	< 0.410	Dry
	Bla15819	Water	0.00150	< 0.000100	Wet
Chromium					
	Bla15571	Animal Tissue	0.0294	< 0.480	Dry
	Bla15576	Animal Tissue	0.00366	< 0.410	Dry
	Bla15819	Water	-0.000513	< 0.000100	Wet
Copper					
	Bla15571	Animal Tissue	0.0314	< 0.480	Dry
	Bla15576	Animal Tissue	0.0571	< 0.410	Dry
	Bla15819	Water	-0.00120	< 0.000100	Wet
Iron					
	Bla15571	Animal Tissue	0.106	< 0.966	Dry
	Bla15576	Animal Tissue	0.0534	< 0.823	Dry
	Bla15819	Water	-0.00280	< 0.000200	Wet
Mercury					
	Bla15737	Animal Tissue	0.0000854	< 0.00868	Dry
	Bla15742	Animal Tissue	0.000113	< 0.00744	Dry
	Bla16021	Water	0.000000200	< 0.000000500	Wet
Potassium					
	Bla15571	Animal Tissue	0.679	< 9.66	Dry
	Bla15576	Animal Tissue	2.04	8.78	Dry
	Bla15819	Water	0.00770	< 0.00200	Wet
Magnesium					
	Bla15571	Animal Tissue	0.0433	< 0.981	Dry
	Bla15576	Animal Tissue	0.0687	< 0.819	Dry
	Bla15819	Water	-0.0000952	< 0.000200	Wet
Manganese					
	Bla15571	Animal Tissue	-0.00197	< 0.191	Dry
	Bla15576	Animal Tissue	0.00381	< 0.164	Dry
	Bla15819	Water	-0.000601	< 0.0000400	Wet
Molybdenum					

Analyte	Lab Sample Number	Lab Sample Matrix	Result Total UG	** BEC (ppm/%)	Basis
	Bla15571	Animal Tissue	0.0748	< 0.966	Dry
	Bla15576	Animal Tissue	0.0401	< 0.823	Dry
	Bla15819	Water	-0.00800	< 0.000200	Wet
Sodium					
	Bla15571	Animal Tissue	3.47	< 193	Dry
	Bla15576	Animal Tissue	0.732	< 165	Dry
	Bla15819	Water	0.0807	< 0.0400	Wet
Nickel					
	Bla15571	Animal Tissue	0.0492	< 0.480	Dry
	Bla15576	Animal Tissue	0.0344	< 0.410	Dry
	Bla15819	Water	-0.00101	< 0.000100	Wet
Phosphorus					
	Bla15571	Animal Tissue	-2.22	< 4.82	Dry
	Bla15576	Animal Tissue	-0.389	< 4.11	Dry
	Bla15819	Water	0.0629	0.00126	Wet
Lead					
	Bla16043	Water	-0.00000310	< 0.0000500	Wet
	Bla16048	Animal Tissue	0.0110	0.0540	Dry
	Bla16053	Animal Tissue	0.0125	0.0540	Dry
Sulfur					
	Bla15571	Animal Tissue	1.99	< 9.81	Dry
	Bla15576	Animal Tissue	2.36	10.2	Dry
	Bla15819	Water	-0.0648	< 0.00200	Wet
Selenium					
	Bla15396	Animal Tissue	0.0000234	< 0.0241	Dry
	Bla15401	Animal Tissue	-0.0000399	< 0.0206	Dry
	Bla16065	Water	0.000335	< 0.000400	Wet
Strontium					
	Bla15571	Animal Tissue	0.00197	< 0.0480	Dry
	Bla15576	Animal Tissue	0.00382	< 0.0410	Dry
	Bla15819	Water	-0.000105	< 0.0000100	Wet
Vanadium					
	Bla15571	Animal Tissue	-0.0000790	< 0.966	Dry

Analyte	Lab Sample Number	Lab Sample Matrix	Result Total UG	** BEC (ppm/%)	Basis
	Bla15576	Animal Tissue	-0.0173	< 0.823	Dry
	Bla15819	Water	-0.000189	< 0.000200	Wet
Zinc					
	Bla15571	Animal Tissue	0.0802	< 0.480	Dry
	Bla15576	Animal Tissue	0.0665	< 0.410	Dry
	Bla15819	Water	0.000709	< 0.000100	Wet
Methyl Mercury					
	Bla15970	Animal Tissue	0.000164	0.000803	Dry
	Bla16006	Water	0.000000300	< 0.0000000100	Wet

** Blank Equivalent Concentration

6. Duplicates

Analyte	Sample Number	Sample Matrix	Basis	Initial Result (ppm/%)	Duplicate Result (ppm/%)	Average	Relative Percent Diff.
Silver							
	T3042023	Water	Wet	< 0.0100	< 0.0100	0.00500	0.000
Aluminum							
	T3042029	Fillets without Skin	Dry	< 4.71	< 4.86	2.39	3.13
	T3042045	Offal	Dry	26.8	25.0	25.9	6.95
	T3042023	Water	Wet	0.0800	0.0800	0.0800	0.000
Arsenic							
	T3042029	Fillets without Skin	Dry	0.363	0.305	0.334	17.4
	T3042045	Offal	Dry	< 1.85	< 1.85	0.925	0.000
	T3042023	Water	Wet	0.00820	0.00860	0.00840	4.76
Boron							
	T3042029	Fillets without Skin	Dry	< 0.942	< 0.972	0.478	3.13
	T3042045	Offal	Dry	< 0.924	< 0.925	0.462	0.110
	T3042023	Water	Wet	0.130	0.131	0.130	0.770
Barium							
	T3042029	Fillets without Skin	Dry	< 0.0940	< 0.0970	0.0478	3.14
	T3042045	Offal	Dry	9.24	9.28	9.26	0.430
	T3042023	Water	Wet	0.0900	0.0880	0.0890	2.25
Beryllium							
	T3042029	Fillets without Skin	Dry	< 0.0471	< 0.0486	0.0239	3.13
	T3042045	Offal	Dry	< 0.0462	< 0.0463	0.0231	0.220
	T3042023	Water	Wet	< 0.000500	< 0.000500	0.000250	0.000
Calcium							
	T3042029	Fillets without Skin	Dry	679	470.	574	36.4
	T3042045	Offal	Dry	22200	23700	23000	6.54

Analyte	Sample Number	Sample Matrix	Basis	Initial Result (ppm/%)	Duplicate Result (ppm/%)	Average	Relative Percent Diff.
	T3042023	Water	Wet	22.7	22.2	22.4	2.23
Cadmium							
	T3042029	Fillets without Skin	Dry	< 0.0471	< 0.0486	0.0239	3.13
	T3042045	Offal	Dry	< 0.0462	< 0.0463	0.0231	0.220
	T3042023	Water	Wet	< 0.0000500	< 0.0000500	0.0000250	0.000
Cobalt							
	T3042029	Fillets without Skin	Dry	< 0.471	< 0.486	0.239	3.13
	T3042045	Offal	Dry	< 0.462	< 0.463	0.231	0.220
	T3042023	Water	Wet	< 0.00500	< 0.00500	0.00250	0.000
Chromium							
	T3042029	Fillets without Skin	Dry	< 0.471	< 0.486	0.239	3.13
	T3042045	Offal	Dry	0.709	0.645	0.677	9.45
	T3042023	Water	Wet	< 0.00500	< 0.00500	0.00250	0.000
Copper							
	T3042029	Fillets without Skin	Dry	1.50	1.57	1.54	4.56
	T3042045	Offal	Dry	2.87	2.75	2.81	4.27
	T3042023	Water	Wet	< 0.00500	< 0.00500	0.00250	0.000
Iron							
	T3042029	Fillets without Skin	Dry	14.6	15.1	14.8	3.37
	T3042045	Offal	Dry	117	114	116	2.60
	T3042023	Water	Wet	0.0400	0.0400	0.0400	0.000
Mercury							
	T3042029	Fillets without Skin	Dry	0.489	0.494	0.492	1.02
	T3042045	Offal	Dry	0.343	0.352	0.348	2.59
	T3042026	Water	Wet	< 0.000000500	< 0.000000500	0.000000250	0.000
Potassium							
	T3042029	Fillets without	Dry	15200	15600	15400	2.60

Analyte	Sample Number	Sample Matrix	Basis	Initial Result (ppm/%)	Duplicate Result (ppm/%)	Average	Relative Percent Diff.
		Skin					
	T3042045	Offal	Dry	10000	9740	9870	2.63
	T3042023	Water	Wet	4.51	4.47	4.49	0.890
Magnesium							
	T3042029	Fillets without Skin	Dry	1160	1190	1180	2.55
	T3042045	Offal	Dry	1010	1010	1010	0.000
	T3042023	Water	Wet	9.29	9.14	9.22	1.63
Manganese							
	T3042029	Fillets without Skin	Dry	0.556	0.515	0.536	7.66
	T3042045	Offal	Dry	36.4	36.9	36.6	1.36
	T3042023	Water	Wet	< 0.00200	< 0.00200	0.00100	0.000
Molybdenum							
	T3042029	Fillets without Skin	Dry	< 0.942	< 0.972	0.478	3.13
	T3042045	Offal	Dry	< 0.924	< 0.925	0.462	0.110
	T3042023	Water	Wet	< 0.0100	< 0.0100	0.00500	0.000
Sodium							
	T3042029	Fillets without Skin	Dry	925	877	901	5.33
	T3042045	Offal	Dry	3520	3510	3520	0.280
	T3042023	Water	Wet	65.0	64.9	65.0	0.150
Nickel							
	T3042029	Fillets without Skin	Dry	< 0.471	< 0.486	0.239	3.13
	T3042045	Offal	Dry	< 0.462	< 0.463	0.231	0.220
	T3042023	Water	Wet	< 0.00500	< 0.00500	0.00250	0.000
Phosphorus							
	T3042029	Fillets without Skin	Dry	11000	11100	11000	0.900
	T3042045	Offal	Dry	17500	18000	17800	2.82
	T3042023	Water	Wet	0.103	0.100	0.102	2.96

Analyte	Sample Number	Sample Matrix	Basis	Initial Result (ppm/%)	Duplicate Result (ppm/%)	Average	Relative Percent Diff.
Lead							
	T3042029	Fillets without Skin	Dry	0.234	0.291	0.262	21.7
	T3042045	Offal	Dry	0.124	0.120	0.122	3.28
	T3042023	Water	Wet	0.0000700	0.0000700	0.0000700	0.000
Sulfur							
	T3042029	Fillets without Skin	Dry	8340	8430	8380	1.07
	T3042045	Offal	Dry	7320	7170	7240	2.07
	T3042023	Water	Wet	10.7	10.7	10.7	0.000
Selenium							
	T3042029	Fillets without Skin	Dry	1.25	1.23	1.24	1.61
	T3042045	Offal	Dry	1.39	1.03	1.21	29.8
	T3042023	Water	Wet	0.000520	0.000540	0.000530	3.77
Strontium							
	T3042029	Fillets without Skin	Dry	0.603	0.321	0.462	61.0
	T3042045	Offal	Dry	29.4	30.7	30.0	4.33
	T3042023	Water	Wet	0.339	0.337	0.338	0.590
Vanadium							
	T3042029	Fillets without Skin	Dry	< 0.942	< 0.972	0.478	3.13
	T3042045	Offal	Dry	< 0.924	< 0.925	0.462	0.110
	T3042023	Water	Wet	0.0100	0.0100	0.0100	0.000
Zinc							
	T3042029	Fillets without Skin	Dry	13.3	13.5	13.4	1.49
	T3042045	Offal	Dry	83.0	83.4	83.2	0.480
	T3042023	Water	Wet	< 0.00500	< 0.00500	0.00250	0.000
Methyl Mercury							
	T3042029	Fillets without Skin	Dry	0.482	0.397	0.440	19.3

Analyte	Sample Number	Sample Matrix	Basis	Initial Result (ppm/%)	Duplicate Result (ppm/%)	Average	Relative Percent Diff.
	T3042001	Water	Wet	0.0000000580	0.0000000710	0.0000000645	20.2
	T3042005	Water	Wet	0.000000134	0.000000125	0.000000130	6.95
	T3042009	Water	Wet	0.000000418	0.000000442	0.000000430	5.58
	T3042013	Water	Wet	0.0000000370	0.0000000200	0.0000000285	59.6

7. Spike Recoveries

Analyte	Sample Number	Sample Matrix	Basis	Spike Level (ppm/%)	Amount Recovered (ppm/%)	*** Spike Background	Percent Recovery
Silver							
	T3042024	Water	Wet	0.0500	0.0450	10.0	90.0
Aluminum							
	T3042038	Fillets without Skin	Dry	193	191	34.0	98.9
	T3042053	Offal	Dry	191	220.	1.25	115
	T3042024	Water	Wet	1.00	0.964	6.02	96.4
Arsenic							
	T3042038	Fillets without Skin	Dry	19.3	18.6	57.7	96.0
	T3042053	Offal	Dry	19.1	18.6	21.1	97.2
	T3042024	Water	Wet	0.00400	0.00390	0.480	97.5
Boron							
	T3042038	Fillets without Skin	Dry	48.4	46.8	102	96.8
	T3042053	Offal	Dry	47.8	45.3	12.7	94.8
	T3042024	Water	Wet	0.500	0.505	3.73	101
Barium							
	T3042038	Fillets without Skin	Dry	9.67	10.0	35.2	104
	T3042053	Offal	Dry	9.56	29.0	0.0700	303
	T3042024	Water	Wet	0.500	0.532	5.38	106
Beryllium							
	T3042038	Fillets without Skin	Dry	0.967	1.03	40.8	106
	T3042053	Offal	Dry	0.956	1.02	42.2	106
	T3042024	Water	Wet	0.0100	0.0106	40.0	106
Calcium							
	T3042038	Fillets without Skin	Dry	967	1070	2.36	111
	T3042053	Offal	Dry	956	5600	0.0200	585

Analyte	Sample Number	Sample Matrix	Basis	Spike Level (ppm/%)	Amount Recovered (ppm/%)	*** Spike Background	Percent Recovery
	T3042024	Water	Wet	20.0	20.6	0.870	103
Cadmium							
	T3042038	Fillets without Skin	Dry	4.84	4.97	204	103
	T3042053	Offal	Dry	4.78	4.74	8.01	99.2
	T3042024	Water	Wet	0.00400	0.00408	160.	102
Cobalt							
	T3042038	Fillets without Skin	Dry	9.67	9.96	40.8	103
	T3042053	Offal	Dry	9.56	9.40	13.6	98.3
	T3042024	Water	Wet	0.100	0.0975	40.0	97.5
Chromium							
	T3042038	Fillets without Skin	Dry	19.3	20.0	81.6	103
	T3042053	Offal	Dry	19.1	18.8	7.19	98.5
	T3042024	Water	Wet	0.100	0.0935	40.0	93.5
Copper							
	T3042038	Fillets without Skin	Dry	19.3	20.2	18.4	104
	T3042053	Offal	Dry	19.1	19.7	8.82	103
	T3042024	Water	Wet	0.200	0.208	80.0	104
Iron							
	T3042038	Fillets without Skin	Dry	193	215	8.63	111
	T3042053	Offal	Dry	191	207	0.790	108
	T3042024	Water	Wet	2.00	2.13	25.0	106
Mercury							
	T3042038	Fillets without Skin	Dry	4.84	5.21	2.78	108
	T3042053	Offal	Dry	4.78	4.56	4.43	95.4
	T3042027	Water	Wet	0.0000400	0.0000452	160.	113
Potassium							
	T3042038	Fillets without	Dry	9670	6900	0.640	71.4

Analyte	Sample Number	Sample Matrix	Basis	Spike Level (ppm/%)	Amount Recovered (ppm/%)	*** Spike Background	Percent Recovery
		Skin					
	T3042053	Offal	Dry	9560	7160	1.01	74.9
	T3042024	Water	Wet	5.00	5.73	1.09	115
Magnesium							
	T3042038	Fillets without Skin	Dry	967	1020	0.930	105
	T3042053	Offal	Dry	956	1030	0.670	108
	T3042024	Water	Wet	10.0	11.9	1.06	119
Manganese							
	T3042038	Fillets without Skin	Dry	48.4	52.5	77.4	109
	T3042053	Offal	Dry	47.8	56.1	0.620	117
	T3042024	Water	Wet	0.500	0.544	250.	109
Molybdenum							
	T3042038	Fillets without Skin	Dry	9.67	9.93	20.4	103
	T3042053	Offal	Dry	9.56	9.65	21.1	101
	T3042024	Water	Wet	0.500	0.481	100.	96.2
Sodium							
	T3042038	Fillets without Skin	Dry	4840	5030	2.67	104
	T3042053	Offal	Dry	4780	5310	0.620	111
	T3042024	Water	Wet	10.0	4.70	0.150	47.0
Nickel							
	T3042038	Fillets without Skin	Dry	9.67	9.86	40.8	102
	T3042053	Offal	Dry	9.56	9.16	5.20	95.8
	T3042024	Water	Wet	0.100	0.0965	40.0	96.5
Phosphorus							
	T3042038	Fillets without Skin	Dry	9670	9860	0.980	102
	T3042053	Offal	Dry	9560	10700	0.320	112
	T3042024	Water	Wet	0.500	0.487	4.46	97.4

Analyte	Sample Number	Sample Matrix	Basis	Spike Level (ppm/%)	Amount Recovered (ppm/%)	*** Spike Background	Percent Recovery
Lead							
	T3042038	Fillets without Skin	Dry	9.67	10.7	60.8	111
	T3042053	Offal	Dry	9.56	10.3	24.6	108
	T3042024	Water	Wet	0.00400	0.00424	44.4	106
Sulfur							
	T3042024	Water	Wet	10.0	9.30	0.910	93.0
Selenium							
	T3042038	Fillets without Skin	Dry	4.84	4.92	5.70	102
	T3042053	Offal	Dry	4.78	5.23	2.83	109
	T3042024	Water	Wet	0.0200	0.0174	38.5	87.1
Strontium							
	T3042038	Fillets without Skin	Dry	19.3	20.1	11.1	104
	T3042053	Offal	Dry	19.1	33.0	0.100	173
	T3042024	Water	Wet	0.200	0.226	0.580	113
Vanadium							
	T3042038	Fillets without Skin	Dry	19.3	20.2	40.8	105
	T3042053	Offal	Dry	19.1	19.5	10.5	102
	T3042024	Water	Wet	0.100	0.107	10.0	107
Zinc							
	T3042038	Fillets without Skin	Dry	96.7	96.9	4.58	100.
	T3042053	Offal	Dry	95.6	94.6	1.13	98.9
	T3042024	Water	Wet	1.00	1.04	400.	104
Methyl Mercury							
	T3042034	Fillets without Skin	Dry	2.70	2.68	7.88	99.0
	T3042003	Water	Wet	0.00000118	0.00000103	15.3	87.5
	T3042005	Water	Wet	0.00000118	0.00000108	8.81	91.2
	T3042009	Water	Wet	0.00000118	0.00000115	2.82	97.6

Analyte	Sample Number	Sample Matrix	Basis	Spike Level (ppm/%)	Amount Recovered (ppm/%)	*** Spike Background	Percent Recovery
	T3042013	Water	Wet	0.00000118	0.000000960	31.9	81.4

*** For a spike to be a valid measure of method accuracy, this ratio must be higher than 1.0.

8. Reference Materials

10. QAQC Summary

1. Procedural Blank Summary

Procedural Blank Summary of Blank Equivalent Concentration (BEC) Data

Within a lab sample matrix, there must be three or more Blank results for a given analyte in order to generate a report.

10.2. Duplicate Summary

Duplicate Summary of Relative Percent Difference (RPD) Data

Within a lab sample matrix and concentration range, there must be three or more Duplicate results for a given analyte in order to generate a report.

10.3. Spike Summary

Spike Summary of Percent Recovery (PR) Data

Within a lab sample matrix, there must be three or more Spike results for a given analyte in order to generate a report.

Analyte	Lab Sample Matrix	No. of Samples	Lowest PR	Highest PR	PR Mean	PR STD
Methyl Mercury	Water	4	81.36	97.63	89.43	6.81

PR = Percent Recovery STD = Standard Deviation

10.4. SRM Summary

Standard Reference Material Summary of Percent Recovery (PR) Data

Within an SRM ID, there must be three or more Recoveries for a given analyte in order to generate a report.

11. QA/QC Anomalies

1. Blank Frequency Anomalies

The required number of blank analyses were performed.

11.2. Duplicate Frequency Anomalies

The required number of duplicate analyses were performed.

11.3. Spike Frequency Anomalies

The required number of spike analyses were performed.

11.4. Reference Material Frequency Anomalies

The required number of Standard Reference Material analyses were performed.

11.5. Mass Spec Frequency Anomalies

No Carbamate, OC, or OP data exists in this set of results; therefore, the anomaly test was not performed.

11.6. Limit of Detection Anomalies

Limits of Detection were within the contract requirements with the following exceptions.

Analyte	Sample Number	Lab Matrix	* CRDL (ppm/%)	Basis	Acceptable To (ppm/%)	LOD (ppm/%)	See QA/QC Note No.
Arsenic	T3042046	Animal Tissue	0.5	Dry	1.50	1.82	1
Arsenic	T3042045	Animal Tissue	0.5	Dry	1.50	1.85	2
Arsenic	T3042047	Animal Tissue	0.5	Dry	1.50	1.87	3
Arsenic	T3042049	Animal Tissue	0.5	Dry	1.50	1.85	4

Limits of Detection were within the contract requirements with the following exceptions.							
Analyte	**Sample Number**	**Lab Matrix**	*** CRDL (ppm/%)**	**Basis**	**Acceptable To (ppm/%)**	**LOD (ppm/%)**	**See QA/QC Note No.**
Arsenic	T3042052	Animal Tissue	0.5	Dry	1.50	1.86	5
Arsenic	T3042055	Animal Tissue	0.5	Dry	1.50	1.63	6
Arsenic	T3042060	Animal Tissue	0.5	Dry	1.50	1.51	7
Arsenic	T3042058	Animal Tissue	0.5	Dry	1.50	1.65	8
Arsenic	T3042056	Animal Tissue	0.5	Dry	1.50	1.83	9
Arsenic	T3042053	Animal Tissue	0.5	Dry	1.50	1.81	10
Arsenic	T3042050	Animal Tissue	0.5	Dry	1.50	1.85	11
Arsenic	T3042048	Animal Tissue	0.5	Dry	1.50	1.89	12
Cobalt	T3042029	Animal Tissue	0.05	Dry	0.150	0.471	13
Cobalt	T3042031	Animal Tissue	0.05	Dry	0.150	0.456	14
Cobalt	T3042032	Animal Tissue	0.05	Dry	0.150	0.489	15
Cobalt	T3042030	Animal Tissue	0.05	Dry	0.150	0.497	16
Cobalt	T3042033	Animal Tissue	0.05	Dry	0.150	0.485	17
Cobalt	T3042035	Animal Tissue	0.05	Dry	0.150	0.480	18
Cobalt	T3042037	Animal Tissue	0.05	Dry	0.150	0.468	19
Cobalt	T3042039	Animal Tissue	0.05	Dry	0.150	0.483	20
Cobalt	T3042057	Animal Tissue	0.05	Dry	0.150	0.310	21
Cobalt	T3042056	Animal Tissue	0.05	Dry	0.150	0.457	22
Cobalt	T3042055	Animal Tissue	0.05	Dry	0.150	0.409	23
Cobalt	T3042054	Animal Tissue	0.05	Dry	0.150	0.327	24
Cobalt	T3042052	Animal Tissue	0.05	Dry	0.150	0.465	25
Cobalt	T3042051	Animal Tissue	0.05	Dry	0.150	0.363	26
Cobalt	T3042050	Animal Tissue	0.05	Dry	0.150	0.461	27
Cobalt	T3042049	Animal Tissue	0.05	Dry	0.150	0.462	28
Cobalt	T3042048	Animal Tissue	0.05	Dry	0.150	0.472	29
Cobalt	T3042060	Animal Tissue	0.05	Dry	0.150	0.377	30
Cobalt	T3042059	Animal Tissue	0.05	Dry	0.150	0.336	31
Cobalt	T3042058	Animal Tissue	0.05	Dry	0.150	0.413	32
Cobalt	T3042047	Animal Tissue	0.05	Dry	0.150	0.467	33
Cobalt	T3042046	Animal Tissue	0.05	Dry	0.150	0.456	34
Cobalt	T3042045	Animal Tissue	0.05	Dry	0.150	0.462	35
Cobalt	T3042044	Animal Tissue	0.05	Dry	0.150	0.471	36

Limits of Detection were within the contract requirements with the following exceptions.							
Analyte	**Sample Number**	**Lab Matrix**	*** CRDL (ppm/%)**	**Basis**	**Acceptable To (ppm/%)**	**LOD (ppm/%)**	**See QA/QC Note No.**
Cobalt	T3042043	Animal Tissue	0.05	Dry	0.150	0.483	37
Cobalt	T3042042	Animal Tissue	0.05	Dry	0.150	0.467	38
Cobalt	T3042041	Animal Tissue	0.05	Dry	0.150	0.484	39
Cobalt	T3042040	Animal Tissue	0.05	Dry	0.150	0.477	40
Cobalt	T3042038	Animal Tissue	0.05	Dry	0.150	0.474	41
Cobalt	T3042036	Animal Tissue	0.05	Dry	0.150	0.480	42
Cobalt	T3042034	Animal Tissue	0.05	Dry	0.150	0.468	43
Sodium	T3042019	Water	0.005	Wet	0.0150	2.00	44
Sodium	T3042022	Water	0.005	Wet	0.0150	2.00	45
Sodium	T3042025	Water	0.005	Wet	0.0150	2.00	46
Sodium	T3042028	Water	0.005	Wet	0.0150	2.00	47
Phosphorus	T3042019	Water	0.005	Wet	0.0150	0.0500	48
Phosphorus	T3042022	Water	0.005	Wet	0.0150	0.0500	49
Phosphorus	T3042025	Water	0.005	Wet	0.0150	0.0500	50
Phosphorus	T3042026	Water	0.005	Wet	0.0150	0.0500	51
Phosphorus	T3042027	Water	0.005	Wet	0.0150	0.0500	52
Phosphorus	T3042028	Water	0.005	Wet	0.0150	0.0500	53
Sulfur	T3042019	Water	0.005	Wet	0.0150	0.100	54
Sulfur	T3042022	Water	0.005	Wet	0.0150	0.100	55
Sulfur	T3042025	Water	0.005	Wet	0.0150	0.100	56
Sulfur	T3042028	Water	0.005	Wet	0.0150	0.100	57
Vanadium	T3042017	Water	0.001	Wet	0.00300	0.0100	58
Vanadium	T3042018	Water	0.001	Wet	0.00300	0.0100	59
Vanadium	T3042019	Water	0.001	Wet	0.00300	0.0100	60
Vanadium	T3042020	Water	0.001	Wet	0.00300	0.0100	61
Vanadium	T3042021	Water	0.001	Wet	0.00300	0.0100	62
Vanadium	T3042022	Water	0.001	Wet	0.00300	0.0100	63
Vanadium	T3042025	Water	0.001	Wet	0.00300	0.0100	64
Vanadium	T3042026	Water	0.001	Wet	0.00300	0.0100	65
Vanadium	T3042027	Water	0.001	Wet	0.00300	0.0100	66
Vanadium	T3042028	Water	0.001	Wet	0.00300	0.0100	67

* CRDL = Contract Required Detection Limit.

11.7. Blank Anomalies

Procedural Blank analyses were acceptable.

11.8. Duplicate Anomalies

All duplicate results were within normal limits with the following exceptions.							
Analyte	**Sample Number**	**Lab Matrix**	**LOD Mean**	**Initial Result ppm/%**	**Duplicate Result ppm/%**	**Relative Percent Diff.**	**See QA/QC Note No.**
Calcium	T3042029	Animal Tissue	4.78	679	470.	36.4	68
Selenium	T3042045	Animal Tissue	0.0231	1.39	1.03	29.8	69
Strontium	T3042029	Animal Tissue	0.0479	0.603	0.321	61.0	70

11.9. Spike Anomalies

All spike results were within normal limits.

11.10. S.R.M. Anomalies

All SRM results were within normal limits with the following exceptions.							
Analyte	**S.R.M. ID**	**Certified Value**	**95% Confidence Interval**	**LOD (ppm/%)**	**Result (ppm/%)**	**% Recovery**	**See QA/QC Note No.**
Strontium	NIST 2976	93.0	2.00	0.0458	67.8	72.9	71
Strontium	NIST 2976	93.0	2.00	0.0466	66.3	71.3	72

S.R.M Names

SRM ID	SRM Name
NIST 2976	Mussel Tissue

11.11. QA/QC Notes

QA/QC Note Number and Comments
1-12 LODs for arsenic were high due to an interference from CaCl. This should have no additional effect on the interpretation of the data. 13-67 These LODs were higher than the ECDMS default. They are acceptable. 68-70 The variability of these duplicate analyses was high. This should have no effect on the interpretation of the data. 71-72 Recovery of Sr from the SRM was slightly low. This should have no effect on the interpretation of the data.

12. Analytical Methods

Below are the analytical methods used by TERL to produce the results included in this report.

Method Codes:	001 005

Lab Matrix	Analyte
Animal Tissue	Aluminum
	Boron
	Barium
	Beryllium
	Calcium
	Cobalt
	Chromium
	Copper
	Iron
	Potassium
	Magnesium
	Manganese
	Molybdenum
	Sodium
	Nickel
	Phosphorus
	Sulfur
	Strontium
	Vanadium
	Zinc

Method Code: 001

LABORATORY: Trace Element Research Laboratory

Digestion of biological tissue.

Liquid or solid biological tissue samples are wet digested with nitric acid and converted into acidic digest solutions for analysis by various atomic spectroscopy methods. When possible, tissue is freeze dried in order to minimize loss of analytes and to facilitate

subsequent sample preparation steps, and then homogenized to a fine powder by ball-milling in plastic containers. Approximately 0.20 to 0.25 g of powdered tissue is weighed into a Teflon reaction vessel and 3 ml of HNO3 are added. The closed reaction vessel is heated in a 130 C oven until digestion is complete. Samples are then diluted to a final volume of 20 ml with quartz distilled water and stored in 1 oz. polyethylene bottles for later analysis by instrumental techniques.

Method Code: 005

LABORATORY: Trace Element Research Laboratory

Analysis of trace metals by inductively coupled plasma
optical emission spectroscopy (ICP).

Liquid samples are nebulized and the resulting aerosol is transported to the plasma torch. Element-specific atomic-line emission spectra are produced by a inductively coupled argon plasma. The spectra are dispersed by a grating spectrometer, and the intensities of the lines are monitored by photomultiplier tubes or solid state detectors. Samples are quantitated by comparison with external standards. One or more internal standards may be incorporated to compensate for physical effects resulting from viscosity and varying levels of total dissolved solids in the samples. Background correction is required and is measured adjacent to analyte lines on samples during analysis.

Method Codes:	001 009

Lab Matrix	Analyte
Animal Tissue	Selenium

Method Code: 001

LABORATORY: Trace Element Research Laboratory

Digestion of biological tissue.

Liquid or solid biological tissue samples are wet digested with nitric acid and converted into acidic digest solutions for analysis by various atomic spectroscopy methods. When possible, tissue is freeze dried in order to minimize loss of analytes and to facilitate subsequent sample preparation steps, and then homogenized to a fine powder by ball-milling in plastic containers. Approximately 0.20 to 0.25 g of powdered tissue is weighed into a Teflon reaction vessel and 3 ml of HNO3 are added. The closed reaction vessel is heated in a 130 C oven until digestion is complete. Samples are then diluted to a final volume of 20 ml with quartz distilled water and stored in 1 oz. polyethylene bottles for later analysis by instrumental techniques.

Method Code: 009

LABORATORY: Trace Element Research Laboratory

Analysis of trace metals by atomic fluorescence

spectroscopy (AFS).

Aqueous samples (including sample digests) are analyzed for mercury and hydride-forming elements (antimony, arsenic, and selenium) by atomic fluorescence. Analytes are introduced to the gas phase by reaction with a strong reducing agent (e.g. stannous chloride for mercury and sodium borohydride for the other elements), and free atoms are bombarded with light of element-specific wavelengths. Light that is released via atomic fluorsecence is measured by a detector set at a right angle to the source. Because of the low background signal, AFS is extremely sensitive and is appropriate when other methods (e.g. GFAAS) lack the sensitivity to determine ambient concentrations. Spectral interferences are few, but the method is subject to chemical and matrix interferences that may impact the cold-vapor and hydride generation steps.

Method Codes:	001 016

Lab Matrix	**Analyte**
Animal Tissue	Arsenic
	Cadmium
	Lead

Method Code: 001

LABORATORY: Trace Element Research Laboratory

Digestion of biological tissue.

Liquid or solid biological tissue samples are wet digested with nitric acid and converted into acidic digest solutions for analysis by various atomic spectroscopy methods. When possible, tissue is freeze dried in order to minimize loss of analytes and to facilitate subsequent sample preparation steps, and then homogenized to a fine powder by ball-milling in plastic containers. Approximately 0.20 to 0.25 g of powdered tissue is weighed into a Teflon reaction vessel and 3 ml of HNO3 are added. The closed reaction vessel is heated in a 130 C oven until digestion is complete. Samples are then diluted to a final volume of 20 ml with quartz distilled water and stored in 1 oz. polyethylene bottles for later analysis by instrumental techniques.

Method Code: 016

LABORATORY: Trace Element Research Laboratory

Analysis of trace metals in water samples by inductively coupled plasma-mass spectroscopy (ICP-MS).

Concentrations of trace elements in water samples are determined with an atomic spectroscopy method that relies on ionization of sample constituents in a high temperature argon plasma and separation of positively-charged ions on the basis of their mass:charge ratios (m:z) by a quadrupole mass spectrometer. The method offers extremely low detection limits but is subject to

interferences from atomic and molecular ions having values within 1 AMU of the target ions. Sample preconcentration and matrix elimination can sometimes eliminate these problems, along with those resulting from high total dissolved solids.

Method Codes:	003 007

Lab Matrix	Analyte
Animal Tissue	Mercury

Method Code: 003

LABORATORY: Trace Element Research Laboratory

Digestion of water, soil, sediment, and biological tissue for mercury analysis.

Before samples are analyzed by the CVAAS method in use in this laboratory, the mercury is converted to the Hg2+ form. Mercury is digested by a modified version of EPA method 245.5 and 245.6. Sediment and tissue samples can be analyzed either freeze dried or on a wet basis. Sediment samples are homogenized by mixing before subsampling, while tissue samples are homogenized in the original sample containers either after freeze drying or with a Tekmar Tissumizer and subsampled. Samples are digested with nitric acid, sulfuric acid, potassium permanganate, and potassium persulfate in polypropylene tubes in a water bath at 90-95 C. Before analysis, hydroxylamine hydrochloride is added to reduce excess permanganate and the samples are brought to volume with distilled-deionized water.

Method Code: 007

LABORATORY: Trace Element Research Laboratory

Analysis of mercury by cold-vapor atomic absorption spectroscopy (CVAAS).

In this procedure, divalent mercury (Hg++) in aqueous samples (digests of water, tissue or sediment samples) is reduced to the elemental state (Hgo) by a strong reducing agent (stannous chloride). Gaseous Hgo enters the sweep gas and is introduced into an atomic absorption cell, where light produced by a mercury vapor lamp is absorbed by the free Hg atoms. Mercury in the sample is determined by comparing light absorption of the sample with that of external calibration standards.

Method Codes:	004 005

Lab Matrix	Analyte

Water	Silver
	Aluminum
	Boron
	Barium
	Beryllium
	Calcium
	Cobalt
	Chromium
	Copper
	Iron
	Potassium
	Magnesium
	Manganese
	Molybdenum
	Sodium
	Nickel
	Phosphorus
	Sulfur
	Strontium
	Vanadium
	Zinc

Method Code: 004

LABORATORY: Trace Element Research Laboratory

Digestion of water samples for "total recoverable" metals
(other than mercury).

Water samples are digested for two hours at 85 degrees Centigrade in polyethylene containers with ultrapure nitric and hydrochloric acids. Acid strength, on a vol:vol basis, is 1% HCl and 0.5% HNO3. Sample aliquots for digestion are taken after vigorous shaking to assure resuspension of solids that may have settled. The original sample must have had preservative added (usually HNO3) in order to ensure that metals do not adhere to the walls of the container.

Method Code: 005

LABORATORY: Trace Element Research Laboratory

Analysis of trace metals by inductively coupled plasma

optical emission spectroscopy (ICP).

Liquid samples are nebulized and the resulting aerosol is transported to the plasma torch. Element-specific atomic-line emission spectra are produced by a inductively coupled argon plasma. The spectra are dispersed by a grating spectrometer, and the intensities of the lines are monitored by photomultiplier tubes or solid state detectors. Samples are quantitated by comparison with external standards. One or more internal standards may be incorporated to compensate for physical effects resulting from viscosity and varying levels of total dissolved solids in the samples. Background correction is required and is measured adjacent to analyte lines on samples during analysis.

Method Codes:	004 009

Lab Matrix	**Analyte**
Water	Selenium

Method Code: 004

LABORATORY: Trace Element Research Laboratory

Digestion of water samples for "total recoverable" metals
(other than mercury).

Water samples are digested for two hours at 85 degrees Centigrade in polyethylene containers with ultrapure nitric and hydrochloric acids. Acid strength, on a vol:vol basis, is 1% HCl and 0.5% HNO3. Sample aliquots for digestion are taken after vigorous shaking to assure resuspension of solids that may have settled. The original sample must have had preservative added (usually HNO3) in order to ensure that metals do not adhere to the walls of the container.

Method Code: 009

LABORATORY: Trace Element Research Laboratory

Analysis of trace metals by atomic fluorescence
spectroscopy (AFS).

Aqueous samples (including sample digests) are analyzed for mercury and hydride-forming elements (antimony, arsenic, and selenium) by atomic fluorescence. Analytes are introduced to the gas phase by reaction with a strong reducing agent (e.g. stannous chloride for mercury and sodium borohydride for the other elements), and free atoms are bombarded with light of element-specific wavelengths. Light that is released via atomic fluorsecence is measured by a detector set at a right angle to the source. Because of the low background signal, AFS is extremely sensitive and is appropriate when other methods (e.g. GFAAS) lack the sensitivity to determine ambient concentrations. Spectral interferences are few, but the method is subject to chemical and matrix interferences that may impact the cold-vapor and hydride generation steps.

Method Codes:	004 016

Lab Matrix	Analyte
Water	Arsenic
	Cadmium
	Lead

Method Code: 004

LABORATORY: Trace Element Research Laboratory

Digestion of water samples for "total recoverable" metals
(other than mercury).

Water samples are digested for two hours at 85 degrees Centigrade in polyethylene containers with ultrapure nitric and hydrochloric acids. Acid strength, on a vol:vol basis, is 1% HCl and 0.5% HNO3. Sample aliquots for digestion are taken after vigorous shaking to assure resuspension of solids that may have settled. The original sample must have had preservative added (usually HNO3) in order to ensure that metals do not adhere to the walls of the container.

Method Code: 016

LABORATORY: Trace Element Research Laboratory

Analysis of trace metals in water samples by inductively
coupled plasma-mass spectroscopy (ICP-MS).

Concentrations of trace elements in water samples are determined with an atomic spectroscopy method that relies on ionization of sample constituents in a high temperature argon plasma and separation of positively-charged ions on the basis of their mass:charge ratios (m:z) by a quadrupole mass spectrometer. The method offers extremely low detection limits but is subject to interferences from atomic and molecular ions having values within 1 AMU of the target ions. Sample preconcentration and matrix elimination can sometimes eliminate these problems, along with those resulting from high total dissolved solids.

Method Codes:	014

Lab Matrix	Analyte
Animal Tissue	% Moisture

Method Code: 014
LABORATORY: Trace Element Research Laboratory Moisture content of sediment, soil, and tissue samples. Moisture content is determined by weight loss upon freeze-drying, and is expressed as weight percent of the original wet sample. Depending upon sample size, either the whole sample or a representative aliquot is frozen and then dried under vacuum until a constant weight is attained. Samples are prepared and dried using plastic materials, whenever possible, in order to minimize potential contamination artifacts that might impact subsequent trace element analysis.

Method Codes:	015

Lab Matrix	Analyte
Animal Tissue	Methyl Mercury

Method Code: 015
LABORATORY: Trace Element Research Laboratory Preparation and analysis of tissue and sediment samples for methyl mercury (MeHg). Methyl mercury and other alkyl mercury compounds are of concern because of their toxicities, and because they are commonly found in the environment. Bioaccumulation results in elevated concentrations in higher trophic levels, especially when lower trophic levels include fish. The procedure used to extract these compounds in the Trace Element Research Laboratory follows the method of Uthe et al. (JAOAC 55: 583-589, 1972), and measures the sum of all organo-mercury species extracted into the solvent. This determination is essentially equivalent to the GC method for analyzing MeHg in fish muscle tissue (where almost all of the organo mercury is present as MeHg). In other organs, such as kidneys, much of the organic mercury may be present as a form other than MeHg, and may not be measured by methods that employ detectors that are specific for halogenated compounds. Samples are analyzed either wet or after freeze-drying. Homogenized aliquots are extracted in to an organic solvent with potassium bromide and copper sulfate added to improve partitioning between phases. The organic phase is digested in combusted glass vials, using nitric and sulfuric acids and potassium permanganate, in order to convert all mercury species to ionic mercury and to remove traces of organic solvent that would otherwise impact the measurement. Analysis is based upon the cold vapor atomic absorption method, although cold vapor atomic fluorescence can be used when lower detection limits are required.

Method Codes:	025

Lab Matrix	Analyte
Water	Mercury

Method Code: 025
LABORATORY: Trace Element Research Laboratory Determination of mercury in water Determination of mercury in water by purging, trapping, and atomic fluorescence. Total mercury is determined in water by oxidation with BrCl followed by reduction of Hg (II) to Hg(0) with SnCl2. Hg(0)g is purged from the aqueous sample with argon and trapped on a gold column. The trapped Hg is released by heating and then analyzed by atomic fluorescence.

Method Codes:	026

Lab Matrix	Analyte
Water	Methyl Mercury
Animal Tissue	Methyl Mercury

Method Code: 026
LABORATORY:Trace Element Research Laboratory Determination of methyl mercury in water Determination of methyl mercury in water by distillation, ethylation, trapping, gas chromatography, and atomic fluorescence. Methyl mercury in water is distilled to separate it from interfering species and then ethylated with sodium tetraethyl borate. Methyl ethyl mercury is trapped on a Tenax column and then separated on an isothermal GC column. Following pyrolysis of the separated species, Hg is detected by atomic fluorescence.